

PURC[™] Radio Paging Stations Control and Application

MUST BE USED WITH Associated Station Manual

Instruction Manual

68P81060E70-A

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FPS-34440-A



instruction manual revision

GENERAL

This revision outlines changes that have occurred since the printing of your instruction manual. Use this information to correct your manual.

INSTRUCTION MANUAL AFFECTED:

68P81060E70-A PURC Radio Paging Stations
Control and Applications

REVISION DETAILS:

- 1. The procedure to set maximum deviation is changed.
 Replace paragraph 2.2 in Jumper Options and Transit Audio
 Level Setting section 68P81062E31-0 with the procedure
 given below.
 - 2.2 Set Maximum Deviation
 - 2.2.1 Without TRN5347A Voice
 Actuated Response Module (VAR)

Step 1. (pre-emphasized audio only) Set modulation as in paragraph 2.1, and adjust exciter IDC control for ±5 kHz total deviation.

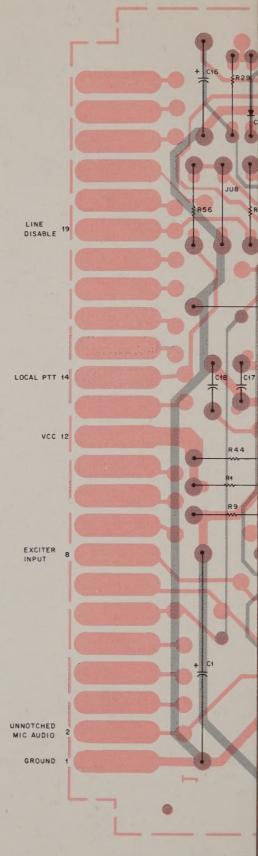
Step 2. (flat audio only) Set modulation as in paragraph 2.1. adjust flat audio IDC control fully clockwise. Adjust exciter IDC control for ±5 kHz total deviation.

2.2.2 With (VAR), the following procedure applies:

PURC TRANSMIT AUDIO LEVEL ADJUSTMENT

- Step 1. Set VAR DISABLE switch on VAR to DISABLE position.
- Step 2. Turn R43 fully clockwise on VAR, for maximum output.
- Step 3. Turn R28 fully clockwise on TRN5348A Flat Audio Board to set minimum resistance.
- Step 4. Set PRE-EMP/FLAT switch on VAR to FLAT position.
- Step 5. Apply a 1 V rms, 1 kHz tone to TRN4859A Line Driver XCTR LEVEL jack.
- Step 6. Adjust exciter IDC control for ±5 kHz peak deviation.
- Step 7. Adjust input level of 1 kHz tone for ±3 kHz deviation.
- Step 8. Set PRE-EMP/FLAT switch on VAR to PRE-EMP position.
- Step 9. Adjust R43 on VAR for ±3 kHz deviation.
- Step 10. Apply a 1 kHz test tone (from phone line) to TRN4859A Line Driver XMTR LINE input, and adjust R39 on line driver for ±3 kHz deviation.
- Step 11. Set VAR DISABLE switch to ENABLED position (opposite DISABLE position).
- 2. Information for TRN5347A Voice Actuated Response Module is added to the instruction manual listed above.





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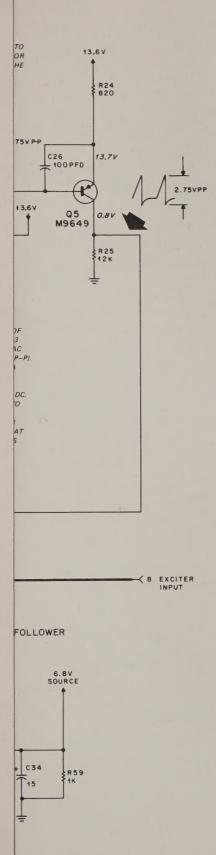
NOTE:

- 1. R53 MOUNTED ON SOLDER SIDE.
- 2. SI AND SE MOUNTED ON FRONT PANEL.

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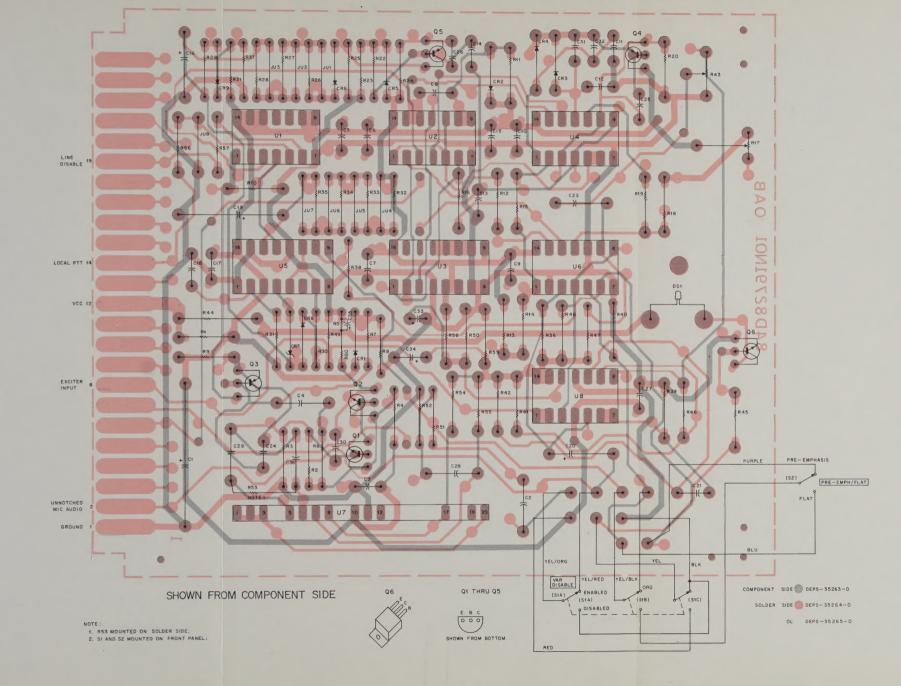
VOICE ACTUATED RESPONSE MODULE

MODEL TRN5347A



FUNCTION

The Voice Actuated Response Module (VAR) monitors the type of audio that is present at the Unnotched Mic Audio (pin 2). If tones are present, the VAR routes this audio to the buffer which has a constant gain throughout the audio frequency range. If voice is present, the VAR provides EIA 6 db per octave preemphasized audio response.



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parts list

REFERENCE	Actuated Respons	
SYMBOL	PART NO.	DESCRIPTION
		capacitor, fixed: uF ± 10%; 50 V: unless otherwise stated
C1	23-84669A19	100 uF + 150-10%; 20 V
C2	8-82905G11 8-11017B08	0.22
C2 C3 C4	8-82905G11	0.22
C5, 6, 7	8-11017B08	.01
C8	21-82187B20	.001 uF ± 10%; 100 V
29. 10	8-11017B08	.01
C11, 12 C13	8-11017A08	.01 uF ± 5%; 50 V 0.1 uF ± 5%; 50 V
213	8-11017A17	0.1 uF ± 5%; 50 V
C14, 15	8-11017B08	.01
C16 C17 C18 C19 C20	23-82783808	1.0 uF ± 20%; 35 V
D18	8-11017B08 21-82187B20	.001 uF ± 10%; 100 V
019	23-83214C15	4.7 uF ± 20%: 25 V
C20	23-84762H08	4.7 uF ± 20%; 25 V 3.9 uF ± 20%; 15 V .001 uF ± 3%; 100 V
U21	21-82537B38	.001 uF ± 3%; 100 V
C22		NOTUSED
C23	8-82905G11	0.22
224, 25, 26	21-11014H49 8-11017B08	100 pF ± 5%; 100 V
227	8-82905G11	0.00
28, 29 230, 31, 32	21-11014H49	100 nF + 5% · 100 V
233	23-84538G01	1.0 uF ± 20%: 35
C34	23-84538G04	15 uF ± 20%; 20 V
035	23-84538G06	0.22 100 pF ± 5%; 100 V 1.0 uF ± 20%; 35 15 uF ± 20%; 20 V 47 uF ± 20%; 20 V 100 pF ± 5%; 100 V
036	21-11014H49	100 pF ± 5%; 100 V
201	48-83654H02	diode: (see note) silicon
DR2 3 4	48-83654H02 48-83654H01	silicon
DR1 DR2, 3, 4 DR5	48-83654H02	silicon
CR6, 8, 9	48-83654H01	silicon
, -, -		
		lamp, incandesent:
DS1	65-83554G01	12 V
		4
11.0	48-869642	transistor. (see note)
21,2	48-869649	NPN: type M9642 PNP: type M9649
Q4	48-869706	
25	48-869649	PNP; type M9649 NPN; type M9640
26	48-869640	NPN; type M9640
		resistor, fixed: ±5%; 1/4 W:
₹1	6-11009C01	unless otherwise stated
32	6-11009D18	680k
3	6-11009D14	470k
34	6-11009C59	2.7k
35	6-11009C35	270
16	6-11009C61	3,3k 12k
R7 R8	6-11009C75	12k 18k
18	6-11009C79 6-11009C45	680
19 R10	6-11009C83	27k
R11	6-11009C97	100k
R12	6-11009C49	1k
R13	6-11009C65	4.7k
R14	6-11009C93	68k
R15, 16	6-11009C49 18-84944C03	1k
R17	18-84944C03 6-11009C93	variable; 10k 68k
R18	6-11009C49	1k
120	6-11009C51	1.2k
321	6-11009D04	180k
322	6-11009C75	12k
R23	6-11009C79	18k
R24	6-11009C47	820
R25 R26	6-11009C75 6-11009C71	12k 8.2k
426 327	6-11009C71 6-11009C59	8.2k 2.7k
R28	6-11009C63	3.9k
729	6-11009D14	470k
R30	6-11009C25	100
R31	6-11009C97	100k
R32	6-11009C73	10k
333	6-11009C85	33k
R34	6-11009C91 6-11009C97	56k 100k
R35, 36, 37	6-11009C97 6-11009C73	100k 10k
138 139	6-11009C/3	1k
R40	6-11009C97	100k
R41	6-11009C67	5.6k
R42	6-11009C73	10k
R43	18-83083G16	variable; 25k
R44	6-125A01	10; 1/2 W
R45	6-11009C61 6-11009C97	3.3k 100k
R46, 47, 48 R49	6-11009C97 6-11009C49	100k
R50	6-11009C49 6-11009C97	18 100k
R51, 52	6-11009C97	100k 12k
R53	6-11009C99	120k
R54 thru 58	6-11009C97	100k
00 Dill 701		
R59 R60	6-11009C49 6-11009C15	1k 39

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		switch:
S1	40-83204B03	dpdt
S2	40-83204B01	dpdt
		integrated circuit: (see note)
U1	51-82884L66	quad 2-input nand Schmitt
U2	51-82884L05	quad 2-input nand gate
U3	51-82884L10	dual j-k flip-flop
U4	51-82884L14	quad analog switch
U5	51-82884L53	dual precision monostable
U6	51-82884L14	quad analog switch
U7	1-80717D13	hybrid notch filter
U8	51-82609M05	quad op-amplifier
		voltage regulator: (see note)
VR1	48-82256C12	Zener type
	me	echanical parts
	3-125790	SCREW, machine: 4-40 x 5/16"; 2 used
	45-83914G01	GUIDE CARD; 2 used
	46-84703E01	GUIDE CARD; circuit board
	61-855798	JEWEL, GRN
	9-84285C01	SOCKET, wedge base
	29-8167C01	TERMINAL, strain relief; 11 used
	9-83697M01	RECEPTACLE, female; 24 used
	43-865080	BUSHING; 2 used
	28-83916F01	CONNECTOR; 13 used
	64-83163L17	PANEL

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.

(VIA VBI)

NOT

- Unless otherwise indicated, resistor values are in ohms; capacitor values are in microfarads; and inductor values are in millihenries.
- Unless otherwise indicated: all waveforms have an amplitude of 13.5 V. All
 waveforms are taken with a 1 kHz sine wave (340 mV p-p) applied to pin 2 of
 module.
- Adjust R17 until the waveform shown on this diagram appears on the positive side of C13.
- 4. Switch S1 shown in enabled position. Switch S2 shown in pre-emphasis
- 5. Normal jumper settings are shown below:

	Voice Lat	ched Timer Jur	mpers	
Time	JU4	JU5	JU6	JU7
1 sec	OUT	OUT	OUT	OUT
950 ms	IN	OUT	OUT	OUT
850 ms	OUT	IN	OUT	OUT
800 ms	EN	IN	TUO	OUT
750 ms	OUT	OUT	IN	OUT
700 ms	IN	OUT	IN	OUT
600 ms	OUT	SN	IN	OUT
500 ms	IN	IN	IN	OUT
500 ms	OUT	OUT	OUT	IN
450 ms	IN	OUT	OUT	1M
350 ms	OUT	IN	OUT	IN
300 ms	IN	IN	OUT	IN
200 ms	OUT	OUT	1N	EN
150 ms	IN	OUT	M	IN
50 ms	OUT	IN	IN	1N

Jumper JUB is usually IN, it is OUT for link transmitters.

Jumpers JU1-JU3 are usually inserted or removed at the factory to provide the proper sensitivity and noise immunity. Normally JU1 is OUT and JU2, JU3 are

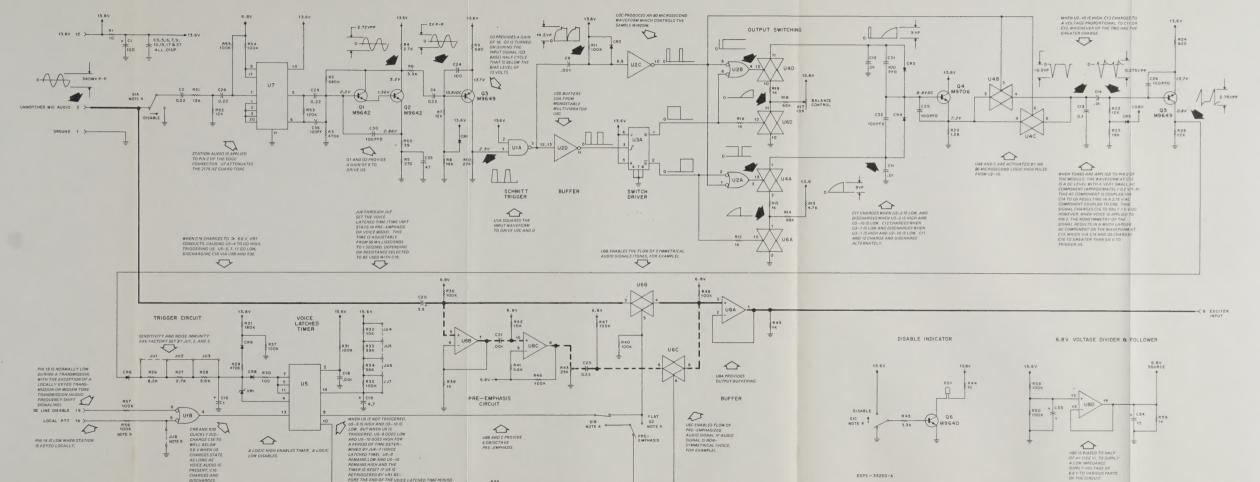
6. This diagram shows positive logic:

Logic "1" greater than 11 V DC Logic "0" less than 4 V DC

- 7. Integrated circuits on this board are CMOS devices.
- 8. IC types and connections for this board are as follows:

Reference Designation	Туре	VCC	Gnd	Description
U1	84L86	14	7	Quad 2-Input NAND Schmitt Trigger
U2	84L05	14	7	Quad 2-Input NAND Gate
U3	84L10	16	8	Dual J-K Flip-Flop
114, 116	84L14	14	7	Quad Analog Switch/Quad Multiplexer
U5	84L53	18	8	Retriggerable/Resettable Monostable Multivibrator
U7	17013	10	11	Hybrid Notch Filter (Attenuates 2175 Hz)
U8	09M05	4	11	Quad Operational Amplifier

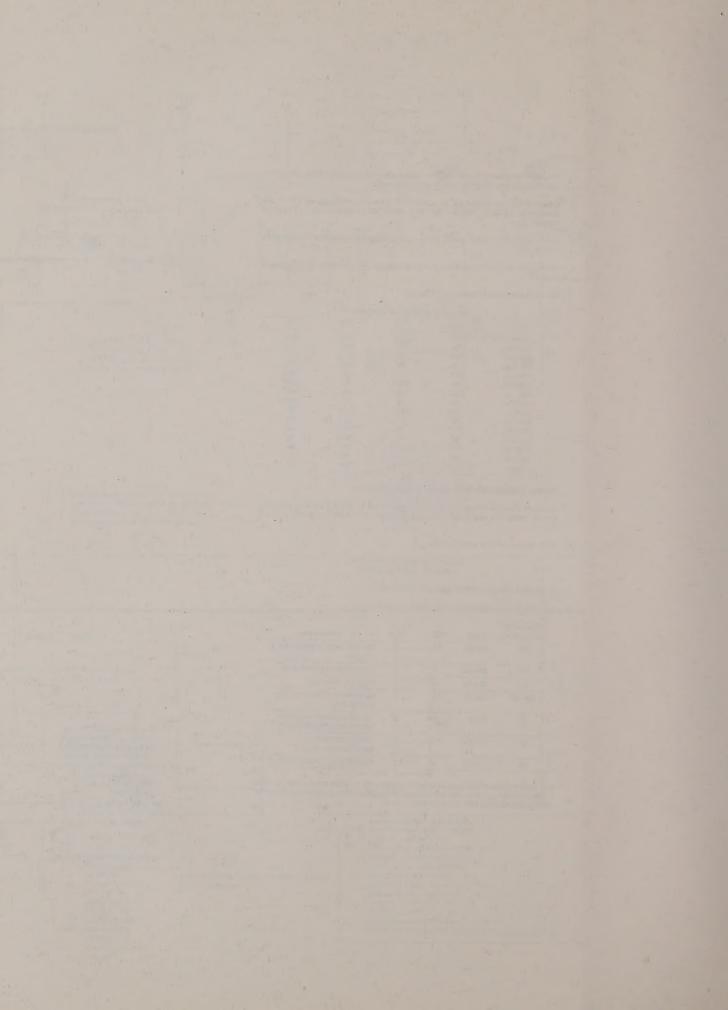
 For paging base station applications, jumper JUB must be in and resistor R56 (100k) must be cut out. For link transmitter applications, jumper JUB must be cut out and resistor R55 must be left in.



FUNCTION

The Voice Actuated Response Module (VAR) monitors the type of audio that is present at the Unnotched Mic Audio (pin 2). If tones are present, the VAR routes this audio to the buffer which has a constant gain throughout the audio frequency range. If voice is present, the VAR provides EIA 6 db per octave preemphasized audio response.

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instruction manual revision

GENERAL

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INSTRUCTION MANUAL AFFECTED:

68P81060E70-A PURC Radio Paging Stations Control and Application

MODELS AFFECTED:

PURC TRANSMITTER	LINK TRANSMITTER
C64JZB Series	C35JZB Series
C71JZB Series	Q2628A
C73JZB Series	Q2629A
C75JZB Series	Q2630A
C84JZB Series	Q2631A

REVISION DETAILS:

The following wire connections and jumpers are added to TRN4860A Unified Remote Control Board.

Wire additions on all models:

	FROM	TO	
COLOR	MODULE-PIN	MODULE-PIN	FUNCTION
BLU	4-16	2-7	KEYED A-
YEL	9-21	J4-9	INTERCOM HI
WHT	10-19	9-19	DC LINE DISABLE
WHT	9-19	6-13	DC LINE DISABLE
YEL/BRN	10-14	11-13	LOCAL PTT
RED/YEL	9-10	12-10	9.6 V DC

Jumper additions:

				PURC	PURC		
				MODELS	MODELS		
		FROM	TO	HTIW	WITHOUT	WITH	LINK
JUMPER	COLOR	MODULE-PIN	MODULE-P1N	SCM	SCM	TOT	MODELS
JU8	WHT	J4-1	J100-10	IN	IN	IN	IN
JU9	A FO\/AHL	12-5	12-8	OUT	OUT	IN	OUT
JU10	VIO	12-5	9-24	OUT	OUT	OUT	LN
JUll	ORG/WHT	12-6	11-14	OUT	OUT	1N	OUT
JU12	ORG	12-6	11-24	OUT	OUT	OUT	1N
JU13	GRN	12-2	4-8	OUT	OUT	OUT	OUT
JU14	WHT/GRN	12-2	12-1	OUT	OUT	OUT	LN
JULS	BRN	2-17	6-18	OUT	IN	OUT	OUT
JU16	WHT/BLK	5-13	6-13	OUT	OUT	OUT	LN



instruction manual revision

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INSTRUCTION MANUAL AFFECTED:

68P81060E70-A PURC Radio Paging Stations

REVISION DETAILS:

The TLN2559A Simulcast Control Module is a new unit that has been added to the PURC station. Add the attached information to your PURC manual immediately following the PAGING SYNTHESIZER section 68P81062E72.





MOTOROLA INC.

Communications Sector

TLN2559A PURC SIMULCAST CONTROL MODULE

1. GENERAL DESCRIPTION

1.1 The TLN2559A Simulcast Control Module (SCM) is a plug-in unit for the remote control chassis of a Micor PURC Paging Station. It consists of two circuit boards, TRN5379A Control Board and TRN5603A Logic Board, fixed together to form the module. The SCM replaces the Function Tone Decoder in the PURC station, providing the keying function to the Paging Transmitter in response to one of three input signals - (a) Push-To-Talk (PTT) Control, (b) Local PTT; and (c) Line PTT. Key-up output signals are provided on the F1 Oscillator Ground and PL disable lines.

- 1.2 The TRN5379A Control board has the interface circuitry required to connect the microcomputer on the TRN5603A Logic Board to the base station and an on-board power supply to run the Logic Board.
- 1.3 The TRN5603A Logic Board contains the MC6803 microcomputer, program ROM, code selector switches, and the support devices for the microcomputer.

2. OPERATION

2.1 The basic function of the SCM is to decode Function Tone (FT) inputs and key the transmitter in response to correct codes. The three key-up request lines on the SCM have different levels of priority. PTT Control and Line PTT are immediate-response inputs with lower priority than Line PTT. Line PTT initiates the computer examination of the FT input line. The FT input goes through waveshaping circuitry and is then applied to the computer. The computer compares the FT input sequence to the code set in the selector switches to determine if the transmitter should be keyed up or not. The Group and Function Tone selection is done according to the following tables:

Group Selection

Group	G2	G3
1	on	on
2	on	off
3	off	on
0	off	off

Note: Station cannot be disabled when Group 0 is selected.

Function Tone Selection

Tone Switch (S1)	Tone Frequency (Hz)
T10	750
Т9	950
Т8	1050
T7	1150
T6	1250
T5	1350
T4	1450
T3	1550
T2	1650
T1	1750

KT1, end-of-sequence indicator tone, is 1950 Hz.

- 2.2 The SCM provides the Delayed Keyed A+ signal to the PURC station in response to a Keyed A+ input signal. The Delayed Keyed A+ stays active for about 180 ms after the Keyed A+ signal drops out. This delay allows the station to have an active A+ signal during temporary losses of Keyed A+ that can occur during mode changeover sequencing. Delayed Keyed A+ also keeps the SCM active during these short periods.
- 2.3 A Line PTT input signal causes the SCM to generate DC Line Disable and FT Window Control signals. DC Line Disable causes the Guard Tone Module to hold Line PTT active. If the function tone sequence stops before the SCM detects KT1, the FT Window control will time out and DC Line Disable will also become inactive about 60 milliseconds after tone input stops. If the computer detects too many function tones the DC Line Disable is dropped. In either case the latest tones are wiped from memory and the SCM returns to input line scanning. In normal operation the FT Window Control closes and DC Line Disable drops after the SCM detects KT1.

2.4 The F1 Oscillator Ground and PL Enable outputs become active after all conditions have been met. Since F1 Oscillator Ground is the final transmitter key-up control, any condition that would inhibit the transmitter will causes this signal to become inactive.

3. CIRCUIT DESCRIPTION

3.1 INPUT CIRCUITS

3.1.1 PTT Key-Up Lines

The PTT inputs are normally high and go low when active. The 12 volt input is converted to a logic-compatible 5 volts by input buffer U14. The buffer's outputs then go directly to the input port of microcomputer U1.

3.1.2 Keyed A +

The Keyed A + signal is applied to transistor Q8. Q8 charges C13 and causes Q9 to saturate. Q10 is normally on at this time, but has no effect. When the Keyed A + signal goes low Q8 shuts off and C13 begins to discharge through the network of R19-R20-R21-R22-R25, keeping Q10 shut off. After the discharge time period set by C13 and the resistor network, Q10 conducts, shutting off Q9. Delayed Keyed A + then goes low.

3.1.3 Function Tone Input

Sine wave tones from the audio line come into lower and upper peak detectors U10A and U10B, respectively. The peak levels are applied to opposite ends of divider network R26-R27-R28. Transmission gate U11 shifts the reference of comparator U10D to either the high-level or low-level reference point of the divider string. Since the circuit is wired in a hysteresis configuration, U11 selects the high-level reference if the input signal is below the reference point, and vice-versa. The output of U10D is a clean square wave signal which is passed through Q11, and then to the computer.

3.2 OUTPUT CIRCUITS

DC Line Disable, FT Window Control, and F1 Oscillator Ground are all transistor outputs driven directly from U1. PL Enable is driven by F1 Oscillator Ground through CR4, which allows PL Enable to be pulled low by another signal in the station without affecting F1 Oscillator Ground.

3.3 MICROCOMPUTER LOGIC

The central logic unit of the SCM is composed of microcomputer U1, octal latch U2, hex buffers U4 and U5 (with associated switch set S1), and address decoders U6 and U7. Timers U8 and U9 perform a watchdog function, keeping track of the computer's timing marks.

3.3.1 Microprocessor

U1 contains the master clock and timing generator, microprocessor, and 128 8-bit bytes of RAM. The processor communicates with the other circuitry of the SCM via four ports. Port 1 (pins 6-10) accepts the conditioned signals from the FT line and services the watchdog circuitry. Diodes CR9 and CR10 set the processor mode as "Extended Multiplexed." Port 2 (pins 13-19) handles all the input/output control signals. Port 3 (pins 22-29) provides the upper eight bits of the address bus. Port 4 (pins 30-37) provides the lower eight bits of address (through octal latch U2) and carries data from the data bus.

3.3.2 ROM

U3 contains the program information the processor needs to detect and process function tones. Address selection is done on pins 1-8, 19, 22, and 23. Data is brought out on pins 9-11 and 13-17.

3.3.3 FT Code Programming Circuit

FT codes are determined in switch set F1. The processor requests code information on address lines A14 and A15. The address decoder composed of U6 and U7 then allows the appropriate buffer to output switch code information to the data bus. The device to output data to the data bus is selected according to the following table:

Device	A14	A15
ROM	1	1
U4	1	0
U5	0	1
not used	0	0

3.3.4 Watchdog Circuit

In normal operation, U1 generates a "tickle pulse" on the P22 line (pin 10) every 66 milliseconds. A time window is established by monostables U8A and U9 during which the tickle pulse must occur. The incoming tickle pulse triggers both monostables. U9 times out before the next tickle pulse while U8A is continuously triggered. If the tickle pulses are too far apart, U8A times out. The Q output of U8A then triggers U8B, the reset pulse generator. If the tickle pulses occur too close together, U9 is still active when the next tickle pulse occurs and gate U6B clears U8A, again triggering the reset pulse generator. When U8B is triggered, the reset signal passes through Q13 and is sent to the reset pin of U1. The Q12-R44-C27 network allows the processor to generate a tickle pulse within about 6 milliseconds after the falling edge of the reset pulse. If U1 does not generate a tickle pulse in this period, U8B sends another reset pulse out. If the tickle pulse occurs normally, U8A is triggered and U8B is shut off.

4. TROUBLESHOOTING

4.1 EQUIPMENT REQUIRED

- -- DC 15 MHz Dual-Trace Oscilloscope
- -- Audio Oscillator
- -- 15 MHz Frequency Counter
- -- Voltmeter
- -- TLN8799A Servicing Board Kit

4.2 FUNCTIONAL TESTS

To service the SCM it will be necessary to first unplug the module, plug in the TLN8799A extension, and then plug the SCM into the extender board. The steel cover can be removed from the TRN5603A Logic Board to gain access to the microcomputer logic assembly.

4.2.1 Power Supply

Measure the voltage on Control Board pin 12 (A+), pin 10 (9.5 V), and U13 pin 3 (5 V). Correct any problems.

4.2.2 Delayed A +

Connect one oscilloscope channel to the Keyed A+ line at pin 24 of the Control Board. Connect the other channel to the Delayed Keyed A+ line at pin 8. Set the oscilloscope to trigger on a low-going transistion occurring on Keyed A+. Apply 12 V to Keyed A+ by using the local PTT switch or a test switch. Release the PTT switch and observe the oscilloscope second channel trace. The trace should show a high-level signal which drops to ground after about 150 milliseconds. If the trace drops immediately, check the timing network for Q10 to determine if there is a component failure. If the trace stays high, check Q9 and Q10.

4.2.5 Control Outputs

The SCM output circuits are simple transistor drivers. Note that PL Enable and F1 Oscillator Ground are returned to a connection in the paging station, not to the SCM ground return. Make all measurements of these leads referenced to the Transmitter Ground, pin 11.

4.2.3 Input Buffer

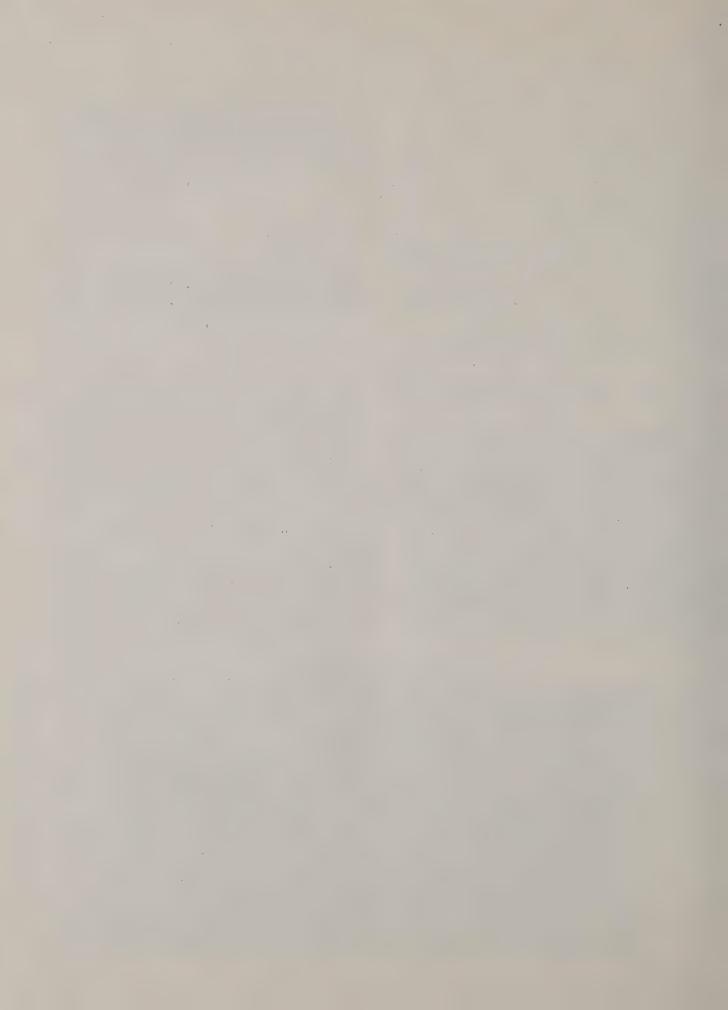
The input buffer is a non-inverting shifter. 12 V input signals should come out as 5 V level signals. Check all inputs and their corresponding outputs for correct levels. Replace U14 to correct any problems.

4.2.4 Function Tone Conditioning Circuit

Connect the audio oscillator to pin 11 (FT HI) of the Control board through a .01 uF capacitor. Set the frequency to 1 kHz and the amplitude to 6 V p-p. Probe the collector of Q11 (line P20) with the oscilloscope to see a 0-5 V 1 kHz square wave signal. Reduce the generator output to .6 V p-p. The P20 signal remains the same. Measure the DC level of FT HI with no audio signal applied. Apply signal and observe U11 pin 14 (comparator reference point) with the oscilloscope. The DC level at this point is the same as that of FT HI, but with a square wave of about 10% of the audio signal level applied to FT HI. Vary the audio signal amplitude and observe the square wave signal amplitude change. If the comparator reference does not show this hystersis effect, check peak detectors U10A and U10B and their associated components, and transmission gate U11.

SCM/STATION JUMPERS (refer to Station Module Jumper Charts)

Non-Unified Main Board TRN5349A (Low Band and VHF	w/board part no. 84-84212N01	- remove JU15
330 Watt Stations)	w/board part no. 84-83601N01	- remove JU15 - jumper Option Slot pin 10 to SCM pin 10 - jumper Guard Tone Decoder pin 13 to SCM pin 19
Unified Main Board TRN4860A (Low Band through 960 MHz Low Power and UHF High Power) TSI Module TRN4853A Station control Module TRN4854B		- jumper Option Slot pin 10 to SCM pin 10 - jumper Guard Tone Decoder pin 13 to SCM pin 19 - remove CR13 - remove JU8
Station Control Module TRN4854A	Unified Chassis TRN4854B	- remove Q12
Digital Modulator Module		- remove module
TRN4856A,B F1 Module TLN5293A w/optional Link Receiver		- remove C23 and C32



SIMULCAST CONTROL MODULE

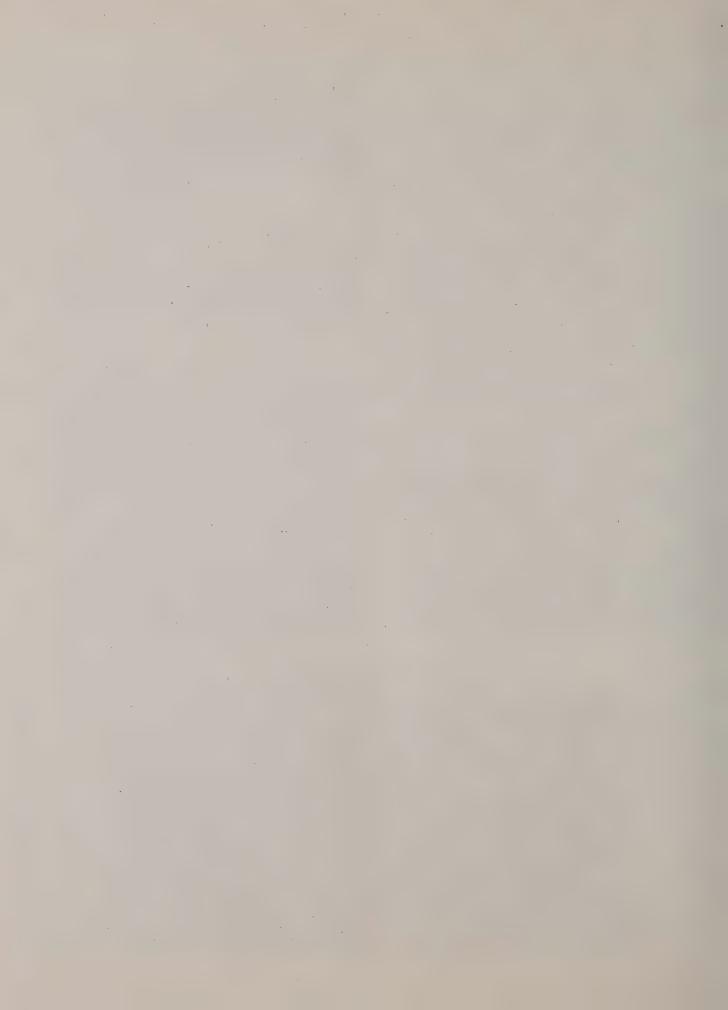
IMULCAST CONTROL MODULE

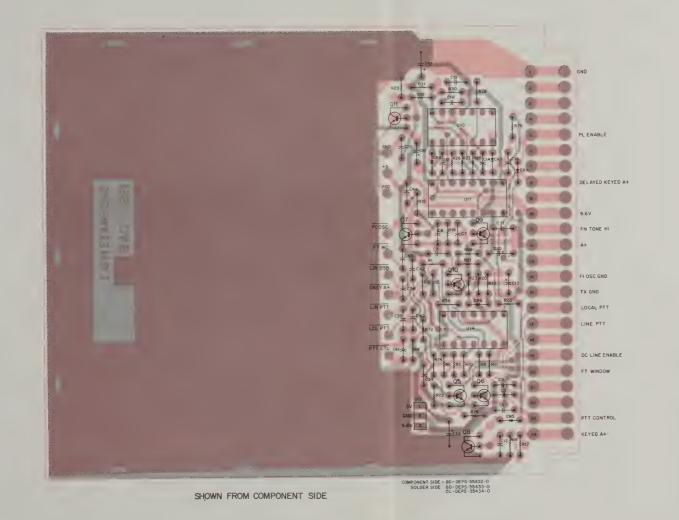
CIRCUIT BOARD DETAIL TRN5379A CONTROL BOARD

parts list

TRN5379A Contro	l Board	PL-8320-O
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		capacitor, fixed:
C1, 2, 3	21-11015B13	.001 uF ± 10%; 100 V
C6	23-84538G06	47 uF ± 20%; 20 V
C7, 8, 9	21-11015A05	.0047 uF + 80 - 20%; 100 V
C11 C12	21-11015A07 21-82187B04	.01 uF + 80 - 20%; 100 V 270 pF ± 10%; 500 V
C13	23-82783B24	15 uF ± 10%; 25 V
C14	21-82610C58	100 pF ± 10%; 100 V
C15,16	23-11019A09	1.0 uF ± 20%; 50 V
C17, 18	21-82610C58	100 pF ± 10%; 100 V
C19	21-11015B13	.001 uF ± 10%; 100 V
C20	21-82187B04	270 pF ± 10%; 500 V
C32 C34	23-84538G06 21-11015A07	47 uF ± 20%; 20 V .01 uF + 80 – 20%; 100 V
C38 thru 41	21-11015A07 21-11015B13	.001 uF ± 10%; 100 V
C42, 43, 44	21-83406D81	20 pF ± 5%; 500 V
- i, i.e., i.i.		
		diode: (see note)
CR4	48-82392B03	silicon
CR5, 6	48-83654H01	silicon
CR7, 8	48-84616A01	Hot carrier
		transistor. (see note)
Q5, 6	48-869642	NPN; type M9642
Q7	48-869567	NPN; type M9567
Q8	48-869642	NPN; type M9642
Q9	48-869328	PNP; type M9328
Q10	48-869643	PNP; type M9643
Q11	48-869642	NPN; type M9642
		resistor, fixed; ±5%: 1/4 W;
		unless otherwise stated
R1, 2, 3, 4	6-11009E65	4.7k
R5, 6	6-11009E73	10k
R9, 10, 11	6-11009E97	100k
R15	6-11009E61	3.3k
R16	6-11009E79	18k
R17 R18	6-11009E65 6-11009E73	4.7k 10k
R19	6-11009E53	1.5k
R20	6-11009E79	18k
R21	6-11009E49	1k
R22	6-11009E45	680
R23	6-11009E75	12k
R24	6-11009E73	10k
R25 R26	6-11009E53 6-11009E63	1.5k 3.9k
R27	6-11009E47	820
R28	6-11009E63	3.9k
R29	6-11009E57	2.2k
R30	6-11009F22	1 meg.
R31, 32	6-11009E87	39k
R33	6-11009E93	68k
R72	6-11009E61	3.3k 18k
R73 R74	6-11009E79 6-11009E61	3 3k
R75	6-11009E79	18k
R76	6-11009E97	100k
	E4 000000	integrated circuit: (see note)
U10	51-83629M09	Quad Low Power Operational Amplifier
U11 U13	51-84887K60 51-84561L76	Analog Multiplexer Voltage Regulator (1.5A)
U14	51-82764K29	Hex Buffer
		echanical parts
	2-132616	NUT, 6-32 × 1/4 × 3/32 × 1/8" SCREW, machine: 6-32 × 3/8"
	3-136194 7-84560N01	BRACKET, heat sink mounting
	26-84434N01	SHIELD
		the description and independent absorbs making

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.





SIMULCAST CONTROL MODULE

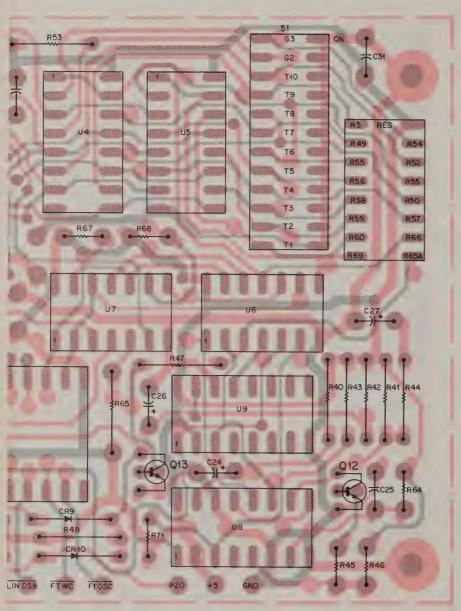
CIRCUIT BOARD DETAIL TRN5379A CONTROL BOARD

parts list

REFERENCE	MOTOROLA		
SYMBOL	PART NO.	DESCRIPTION	
		capacitor, fixed:	
C1, 2, 3	21-11015B13	.001 uF ± 10%; 100 V	
C6	23-84538G06	47 uF ± 20%; 20 V	
C7, 8, 9	21-11015A05	.0047 uF + 80 - 20%; 100 V	
C11	21-11015A07	.01 uF + 80 - 20%; 100 V	
C12	21-82187B04	270 pF ± 10%; 500 V	
C13	23-82783B24	15 uF ± 10%; 25 V	
C14	21-82610C58	100 pF ± 10%; 100 V	
C15,16	23-11019A09	1.0 uF ± 20%; 50 V	
C17, 18	21-82610C58	100 pF ± 10%; 100 V	
C19	21-11015B13	.001 uF ± 10%; 100 V	
C20	21-82187B04	270 pF ± 10%; 500 V	
C32	23-84538G06	47 uF ± 20%; 20 V	
C34	21-11015A07	.01 uF + 80 - 20%; 100 V	
C38 thru 41	21-11015B13	.001 uF ± 10%; 100 V	
C42, 43, 44	21-83406D81	20 pF ± 5%; 500 V	
		diode: (see note)	
CR4	48-82392B03	silicon	
CR5, 6	48-83654H01	silicon	
CR7, 8	48-84616A01	Hot carrier	
		transistor: (see note)	
Q5, 6	48-869642	NPN; type M9642	
Q7	48-869567	NPN; type M9567	
Q8	48-869642	NPN; type M9642	
Q9	48-869328	PNP; type M9328	
Q10	48-869643	PNP; type M9643	
Q11	48-869642	NPN; type M9642	
		resistor, fixed; ±5%: 1/4 W;	
		unless otherwise stated	
R1, 2, 3, 4	6-11009E65	4.7k	
R5, 6	6-11009E73	10k	
R9, 10, 11	6-11009E97	100k	
R15	6-11009E61	3.3k	
R16	6-11009E79	18k	
R17	6-11009E65	4.7k	
R18	6-11009E73	10k	
R19	6-11009E53	1.5k	
R20	6-11009E79	18k	
R21	6-11009E49	1k	
R22	6-11009E45	680	
R23	6-11009E75	12k	
R24	6-11009E73	10k	
R25	6-11009E53	1.5k	
R26	6-11009E63	3.9k	
R27	6-11009E47	820	
R28	6-11009E47	3.9k	
R28	6-11009E63	2.2k	
R30	6-11009E37	1 meg.	
	6-11009F22 6-11009E87	39k	
R31, 32		68k	
R33	6-11009E93	3.3k	
R72	6-11009E61	3.3K 1Bk	
R73	6-11009E79		
R74	6-11009E61	3.3k	
R75	6-11009E79	18k	
R76	6-11009E97	100k	
		integrated circuit: (see note)	
U10	51-83629M09	Quad Low Power Operational Amplifie	
U11	51-84887K60	Analog Multiplexer	
U13	51-84561L76	Voltage Regulator (1.5A)	
U14	51-82764K29	Hex Buffer	
		nechanical parts	
	2-132616	NUT, 6-32 × 1/4 × 3/32 × 1/8"	
	3-136194	SCREW, machine: 6-32 × 3/8"	
	7-84560N01	BRACKET, heat sink mounting	
	26-84434N01	SHIELD	

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.

68P81063E72-O (Sheet 1 of 3) 12/17/82 - V & G



COMPONENT SIDE | BD - DEPS-35435-0 SOLDER SIDE | BD - DEPS-35436-0 OL - DEPS-35437-0

MULCAST CONTROL MODULE

MODEL TLN2559A

FUNCTION

Decodes Function Tone signals and keys the transmitter in response to correct code sequences.

parts list

REFERENCE	MOTOROLA PART NO.	DESCRIPTION
SIMBOL	3-125790	SCREW, machine: 4-40 × 5/16"; 6 used
	45-83914G01	GUIDE, card; 2 used
	46-84703E01	GUIDE, circuit board
	64-83163L16	PANEL

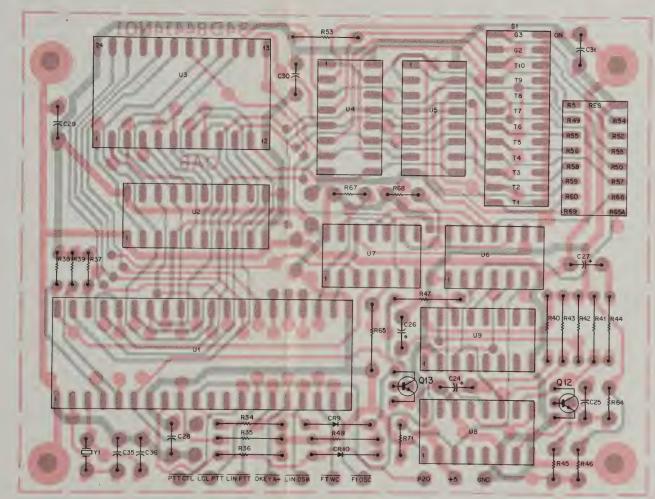
SIMULCAST CONTROL BOARD

CIRCUIT BOARD DETAIL TRN5603A LOGIC BOARD

parts list

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		capacitor, fixed:
C24	23-11013D09	4.7 uF ± 10%; 20 V
C25	8-11017A15	.056 uF ± 5%; 50 V
C26	23-11013D09	4.7 uF ± 10%; 20 V
C27		
	23-11013C56	22 uF ± 20%; 15 V
C28 thru 31	21-11015A07	.01 uF + 80 - 20%; 15 V
C35, 36	21-11014H35	27 pF ±5%; 100 V
		diode: (see note)
CR8, 9	48-82392B03	silicon
		transistor: (see note)
Q12, 13	48-869642	NPN; type M9642
		resistor, fixed; ±5%: 1/4 W;
		unless otherwise stated
R34, 35, 36	6-11009C65	4.7k
R37	6-11009E65	4.7k
R38, 39	6-11009E25	100
R40	6-11009C97	100k
R41	6-11009C77	15k
R42	6-11009C73	10k
R43	6-11009C65	4.7k
R44	6-11009C10	24
R45	6-11009E17	47
R46	6-11009C51	1.2k
R47	6-11009C47	820
R48	6-11009C23	82
R49 thru 54	p/o 51-84333G23	3.3k resistor network
R55	p/o 51-84333G23	1.7k resistor network
R56 thru 60	p/o 51-84333G23	3.3k resistor network
R64	6-11009F04	180k
R65	6-11009C51	1.2k
R65A, 66	p/o 51-84333G23	3.3k resistor network
R67, 68, 69	6-11009E65	4.7k
R71	6-11009E73	10k
		switch:
S1	40-83022M04	12 position; spst
		integrated circuit: (see note)
U1	51-83625M06	Microprocessor
U2	51-83627M03	Octal Transparent Latch
U3	51-83625M94	ROM
U4, 5	51-84561L77	Hex Buffer, 4-bit and 2-bit (3-state)
U6	51-84371K83	Quad 2-input NAND gate
U7	51-84561L04	Quad 2-input NAND gate Quad 2-input NAND gate
U8, 9	51-84561L11	Monostable Multivibrator
		crystal: (see note)
Y1	48-82611M03	3.9672 MHz
	mee	chanical parts
	9-84924E01	SOCKET, 24-contact
	14-84602K02	INSULATOR
	29-82713M01	TERMINAL, lug; 20 used

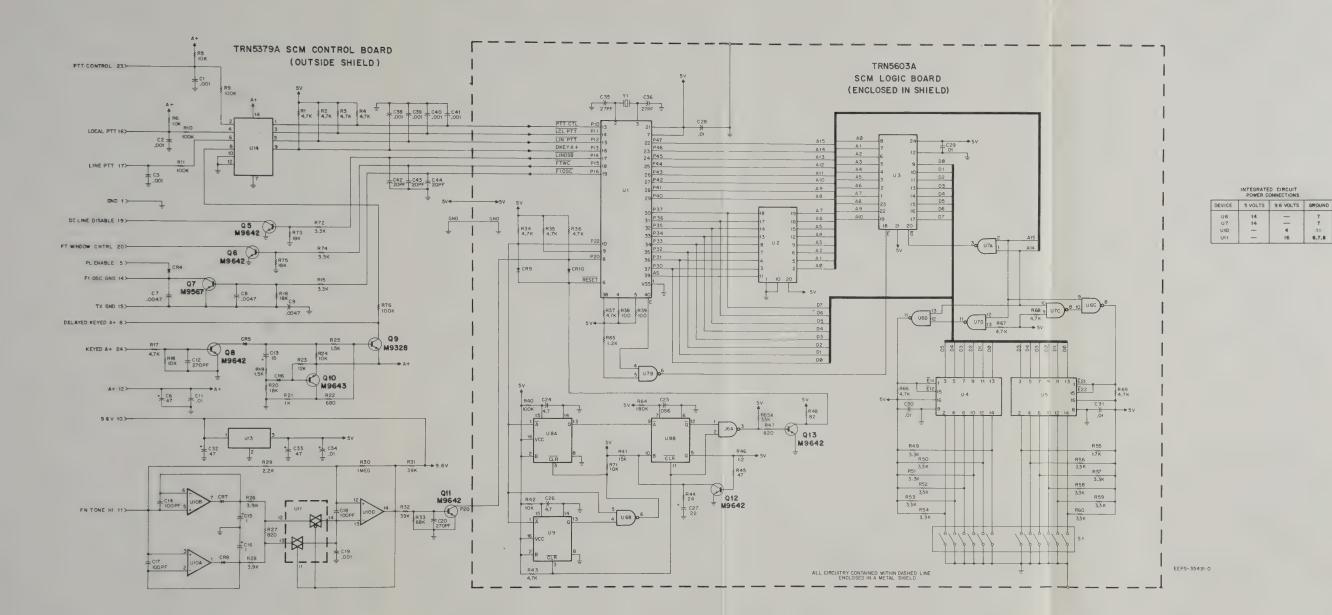
note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.



SHOWN FROM COMPONENT SIDE

COMPONENT SIDE #BD - DEPS-35435-0 SOLDER SIDE #BD - DEPS-35436-0 OL - DEPS - 35437-0





FUNCTION

Decodes Function Tone signals and keys the transmitter in response to correct code sequences.

parts list

SYMBOL	MOTOROLA PART NO.	DESCRIPTION
	3-125790	SCREW, machine: 4-40 × 5/16"; 6 used
	45-83914G01	GUIDE, card; 2 used
	46-84703E01	GUIDE, circuit board
	64-83163L16	PANEL





instruction manual revision

GENERAL

This revision outlines changes that have occurred since the printing of your instruction manual. Use this information to correct your manual.

INSTRUCTION MANUAL AFFECTED:

68P81060E70-A PURC Radio Paging Stations

REVISION DETAILS:

This revision updates SMR-4521, TLN2559A PURC Simulcast Control Module. The Group Selection Chart at the top of page 1 in section 68P81063E73 has been revised to read:

Group	<u>G2</u>	<u>G3</u>
0	ON	ON
1	OFF	OFF
2	ON	OFF
3	OFF	ON

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instruction manual revision

GENERAL

This revision outlines changes that have occurred since the printing of your instruction manual. Use this information to correct your manual.

INSTRUCTION MANUAL AFFECTED:

68P81060E70-A

PURC Radio Paging Stations Instruction Manual

REVISION DETAILS:

The Paging Synthesizer frequency ranges have been expanded to include 132-150 MHz (TLD2592A Synthesizer) and 406-420 MHz (TLE2271A Synthesizer) bands. Modify parts list PL-8091 on PEPS-34989 with the following changes:

TLD9332A Synthesizer Brd VHF 132-150 MHz			Description
			Capacitor
~10 10	040 40	21-82537B45	5000 pF; ±1%; 100 V
C42,43	C42,43		
C715	C715	21-82610C70	150 pF; ±5%; NPO
C716	C716	21-82610C44	100 pF; ±5%; N220
C721	C721	21-82610C09	120 pF; ±5%; N220
C722	C722	21-82610C30	68 pF; ±5%; N330
	C725	21-83406D81	20 pF; ±5%; NPO
C725			
C726	C726	21-83406D57	13 pF; ±5%; NPO
			Resistor
R25,26	R25,26	6-84376L09	7.6k; $\pm 0.5\%$; $1/4$ W
R137	No Change	6-11009A90	51k; 5%; 1/4 W
	110 01101-0		
Jumpers	****	Domeste	
JU6,8	JU6,8	Remove	
JU5,7	JU5,7	Insert	

GENERAL SAFETY INFORMATION

The United States Department of Labor, through the provisions of the Occupational Safety and Health Act of 1970 (OSHA), has established an electromagnetic energy safety standard which applies to the use of this equipment. Proper use of this radio will result in exposure below the OSHA limit. The following precautions are recommended:

DO NOT operate the transmitter of a mobile radio when someone outside the vehicle is within two feet (0.6 meter) of the antenna.

DO NOT operate the transmitter of a fixed radio (base station, microwave and rural telephone rf equipment) or marine radio when someone is within two feet (0.6 meter) of the antenna.

DO NOT operate the transmitter of any radio unless all RF connectors are secure and any open connectors are properly terminated.

In addition,

DO NOT operate this equipment near electrical blasting caps or in an explosive atmosphere.

All equipment must be properly grounded according to Motorola installation instructions for safe operation.

All equipment should be serviced only by a qualified technician.

Refer to the appropriate section of the product service manual for additional pertinent safety information.

EPS-28750-O

COMMERCIAL WARRANTY (STANDARD)

Motorola radio communications products are warranted to be free from defects in material and workmanship for a period of ONE (1) YEAR, (except for crystals and channel elements which are warranted for a period of ten (10) years) from the date of shipment. Parts, including crystals and channel elements, will be replaced free of charge for the full warranty period but the labor to replace defective parts will only be provided for One Hundred-Twenty (120) days from the date of shipment. Thereafter purchaser must pay for the labor involved in repairing the product or replacing the parts at the prevailing rates together with any transportation charges to or from the place where warranty service is provided. This express warranty is extended by Motorola Communications and Electronics, Inc., 1301 E. Algonquin Road, Schaumburg, Illinois 60196, to the original purchaser only, and only to those purchasing for purpose of leasing or solely for commercial, industrial, or governmental use.

THIS WARRANTY IS GIVEN IN LIEU OF ALL OTHER WARRANTIES EXPRESS OR IMPLIED WHICH ARE SPECIFICALLY EXCLUDED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL MOTOROLA BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES TO THE FULL EXTENT SUCH MAY BE DISCLAIMED BY LAW.

In the event of a defect, malfunction or failure to conform to specifications established by seller, or if appropriate, to specifications accepted by Seller in writing, during the period shown, Motorola, at its option, will either repair or replace the product or refund the purchase price thereof, and such action on the part of Motorola shall be the full extent of Motorola's liability hereunder.

This warranty is void if:

- a. the product is used in other than its normal and customary manner;
- b. the product has been subject to misuse, accident, neglect or damage;
- c. unauthorized alterations or repairs have been made, or unapproved parts used in the equipment.

This warranty extends only to individual products, batteries are excluded, but carry their own separate limited warranty. Because each radio system is unique, Motorola disclaims liability for range, coverage, or operation of the system as a whole under this warranty except by a separate written agreement signed by an officer of Motorola.

Non-Motorola manufactured products are excluded from this warranty, but subject to the warranty provided by their manufacturers, a copy of which will be supplied to you on specific written request.

In order to obtain performance of this warranty, purchaser must contact its Motorola salesperson or Motorola at the address first above shown, attention Quality Assurance Department.

This warranty applies only within the United States.

EPS-27734-O

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PURC

RADIO PAGING STATIONS CONTROL AND APPLICATION

Communications Sector

NUMBER **SECTION** CONTENTS Station Model Charts Pages vii, viii DESCRIPTION Station Control......Page 1

JUMPER OPTIONS AND TRANSMIT AUDIO LEVEL SETTINGS

DIAGRAMS

STATION BLOCK DIAGRAMPEPS-34628
TCN1383A NON-UNIFIED REMOTE CONTROL CHASSIS INTERCONNECT CHART EEPS-35131
TRN5349A NON-UNIFIED REMOTE CONTROL BOARD CIRCUIT BOARD DETAIL & PARTS LIST
TCN1282A UNIFIED REMOTE CONTROL CHASSIS INTERCONNECT CHART
TRN4860A UNIFIED REMOTE CONTROL BOARD CIRCUIT BOARD DETAIL & PARTS LIST PEPS-34630
TRN5348A TRANSMITTER FLAT AUDIO BOARD CIRCUIT BOARD DETAIL, SCHEMATIC DIAGRAM & PARTS LIST
TRN4856B DIGITAL MODULATOR MODULE CIRCUIT BOARD DETAIL, SCHEMATIC DIAGRAM & PARTS LIST
F1 & F1-PL TONE DECODER MODULES
TRN4853A TRANSMITTER SITE INTERFACE MODULE CIRCUIT BOARD DETAIL, SCHEMATIC DIAGRAM & PARTS LIST
TRN4859A LINE DRIVER MODULE CIRCUIT BOARD DETAIL, SCHEMATIC DIAGRAM & PARTS LIST
TRN4892A GUARD TONE DECODER MODULE CIRCUIT BOARD DETAIL, SCHEMATIC DIAGRAM & PARTS LIST
TRN4854B STATION CONTROL MODULE CIRCUIT BOARD DETAIL, SCHEMATIC DIAGRAM & PARTS LIST
TRN4854A STATION CONTROL MODULE CIRCUIT BOARD DETAIL, SCHEMATIC DIAGRAM & PARTS LIST
TRN4857A ALARM LOGIC MODULE SECTION
TLB8170A & TLB8270A SERIES EXCITER SCHEMATIC DIAGRAM, CIRCUIT BOARD DETAIL, & PARTS LIST
TLD5321B & TLD5322B EXCITERS SCHEMATIC DIAGRAM, CIRCUIT BOARD DETAIL, AND PARTS LIST
TLE1720B SERIES EXCITER/1ST BANDPASS FILTER, AND TLE1600B SERIES TRIPLER/LOW LEVEL AMPLIFIER, CIRCUIT BOARD DETAIL, SCHEMATIC DIAGRAM & PARTS LIST
PAGING SYNTHESIZER SECTION
JUMPER & CABLE CONNECTIONS FOR TDN6869A/70A MODEMS
WATTMETER OPTIONS

FOREWORD

1. SCOPE OF MANUAL

This manual is intended for use by experienced technicians familiar with similar types of equipment. It contains all service information required for the equipment described and is current as of the printing date. Changes which occur after the printing date are incorporated by Instruction Manual Revisions (SMR). These SMR's are added to the manuals as the engineering changes are incorporated into the equipment.

2. MODEL AND KIT IDENTIFICATION

Motorola equipments are specifically identified by an overall model number on the nameplate. In most cases, assemblies and kits which make up the equipment also have kit model numbers stamped on them. When a production or engineering change is incorporated, the applicable schematic diagrams are updated.

As diagrams are updated, information about the change is incorporated into a revision column. This revision column appears in the manual next to the parts list or, in some cases, on the diagram. It lists the reference number, part number, and description of the parts removed or replaced.

3. SERVICE

Motorola's National Service Organization offers one of the finest nation-wide installation and maintenance programs available to communication equipment users. This organization includes approximately 900 authorized Motorola Service Stations (MSS) located throughout the United States, each manned by one or more trained, FCC licensed technicians.

These MSS's are independently owned and operated and were selected by Motorola to service its customers. Motorola maintenance is available on either a time and material basis or on a periodic fixed-fee type arrangement.

The administrative staff of this organization consists of national, area and district service managers and district representatives, all of whom are Motorola employees with the objective to improve the service to our customers.

Should you wish to purchase a service contract for your Motorola equipment, contact your Motorola Service Representative, or write to:

National Service Manager Motorola Communications and Electronics, Inc. 1303 E. Algonquin Road Schaumburg, Illinois 60196

4. REPLACEMENT PARTS ORDERING

Motorola maintains a number of parts offices strategically-located throughout the United States. These facilities are staffed to process parts orders, identify part numbers, and otherwise assist in the maintenance and repair of Motorola Communications Group products.

Orders for all parts *except* crystals, active filters, code plugs, channel elements, and "Vibrasender" [®] and "Vibrasponder" [®] resonant reeds should be sent to the nearest area parts center. Orders for instruction manuals should also be sent to the area parts center.

When ordering replacement parts or equipment information, the complete identification number should be included. This applies to all components, kits, and chassis. If the component part number is not known, the order should include the number of the chassis or kit of which it is a part, and sufficient description of the desired component to identify it.

Orders for crystals, channel elements, active filters, PROMs, code plugs, and reeds should be sent directly to the factory address listed on the following page. Crystal and channel element orders should specify the crystal or channel element type number, crystal and carrier frequency, and the chassis model number in which the part is used.

Orders for active filters, PROMs, code plugs, *Vibrasender* and *Vibrasponder* resonant reeds should specify type number and frequency, should identify the owner/operator of the communications system in which these items are to be used; and should include any serial numbers stamped on the components being replaced.

5. ADDRESSES

5.1 GENERAL OFFICES

MOTOROLA Communications and Electronics Inc.
Communications & Electronics Parts 1313 E. Algonquin Rd.,
Schaumburg, Illinois 60196
Phone: 312-576-3900

5.2 U.S. ORDERS

WESTERN AREA PARTS

1170 Chess Drive, Foster City, San Mateo, California 94404 Phone: 415-349-3111 TWX: 910-375-3877

MIDWEST AREA PARTS

1313 E. Algonquin Road Schaumburg, Ill. 60196 Phone: 312-576-7430 TWX: 910-693-0869

MID-ATLANTIC AREA PARTS

7230 Parkway Drive Hanover, Maryland 20176 Phone: 301-796-8763 TWX: 710-862-1941

EAST CENTRAL AREA PARTS

12995 Snow Road, Parma, Ohio 44130 Phone: 216-433-1560 TWX: 810-421-8845

EASTERN AREA PARTS

85 Harristown Road, Glen Rock, New Jersey 07452 Phone: 201-444-9662 TWX: 710-988-5602

PACIFIC SOUTHWESTERN AREA PARTS

P.O. Box 85036 San Diego, California 92138 Phone: 714-578-8030 TWX: 910-335-1516

GULF STATES AREA PARTS

1140 Cypress Station P.O. Box 73115 Houston, Texas 77090 Phone: 713-537-3636 TWX: 910-881-6392

SOUTHWESTERN AREA PARTS

P.O. Box 34290 3320 Belt Line Road, Dallas, Texas 75234 Phone: 214-620-8511 TWX: 910-860-5505

SOUTHEASTERN AREA PARTS

P.O. Box 368 Decatur, Georgia 30031 Phone: 504-987-2232 TWX: 810-766-0876

5.3 CANADIAN ORDERS

MOTOROLA LTD.

National Parts Department 3125 Steeles Avenue East Willowdale, Ontario M2H 2H6

Phone: 416-499-1441 TWX: 610-491-1032 Telex: 06-526258

5.4 ALL COUNTRIES EXCEPT U.S. AND CANADA

MOTOROLA, INC.

International Parts Dept.
1313 E. Algonquin Road
Schaumburg, Illinois 60196 U.S.A.

Phone: 312-576-6492 TWX: 910-693-0869 Telex: 722443

Cable: MOTOL PARTS

5.5 FACTORY ADDRESS FOR CRYSTAL, CHANNEL ELEMENT, ACTIVE FILTER, CODE PLUGS, PROMS, AND RESONANT REED ORDERS

ALL MAIL ORDERS

Motorola, Inc.
Component Products Sales & Service
P.O. Box 66191
O'Hare International Airport
Chicago, Ill. 60666

CORRESPONDENCE

Motorola, Inc.
Component Products Sales & Service
2553 N. Edgington Street
Franklin Park, Illinois 60131
Phone: 312-451-1297
TWX: 910-227-0799
Telex: 433-0067

CODE:

MODEL B93JZB1106A B91JZB1106A B91JZB1101A B93JZB1101A

= ONE SUPPLIED

= FREQUENCY SENSITIVE COMPONENT

= INDICATES A MODEL SERIES

		ITEM	DESCRIPTION
		KXN1028B	CHANNEL ELEMENT (5 PPM TRANSMIT)
		KXN1018C	CHANNEL ELEMENT (2 PPM TRANSMIT)
	Q_{\perp}	TFB6010A	HARMONIC FILTER
	\star	TFB6012A .	HARMONIC FILTER (30-36 MHz)
*	*	TFB6013A	HARMONIC FILTER (36-42 MHz)
	\star	TFB6014A	HARMONIC FILTER (42-50 MHz)
		TFD6090A	HARMONIC FILTER (136-174 MHz)
	0	TLB1550A	EXCITER DRIVER
	\star	TLB1552A	EXCITER DRIVER (30-36 MHz)
	\star	TLB1553A	EXCITER DRIVER (36-42 MHz)
	\star	TLB1554A	EXCITER DRIVER (42-50 MHz)
	Q	TLD2580A	EXCITER DRIVER
\star		TLD2581A	EXCITER DRIVER (136-150.8 MHz)
\star	\perp	TLD2582A	EXCITER DRIVER (150.8-162 MHz)
X	*	TLD2583A	EXCITER DRIVER (162-174 MHz)
0	0	TLB8140A	POWER AMPLIFIER
*	\star	TLB8142A	POWER AMPLIFIER (30-36 MHz)
	*	TLB8143A	POWER AMPLIFIER (36-42 MHz)
	\star	TLB8144A	POWER AMPLIFIER (42-50 MHz)
	0	TLD5080A	POWER AMPLIFIER
\star	*	TLD5081A	POWER AMPLIFIER (136-150.8 MHz)
\star	\star	TLD5082A	POWER AMPLIFIER (150.8-162 MHz)
\star	*	TLD5083A	POWER AMPLIFIER (162-174 MHz)
	00	TKN6733A	TRANSMITTER CABLE
00	00	TLN1434A	TRANSMITTER SHIELD
	00	THN6194B	CABINET
00	0 0	TRN5599A	AC JUNCTION BOX
	00	TLN5697A	METER PANEL
		TKN8284A	DIGITAL MODULATOR CABLE
	00	TLN1675A	CHASSIS METER & CABLE
	0 0	TRN8686A	SERVICE BOARD CARD PULLER
00	00	TKN8214A	MODEM CABLE
• •		TLN4198A	AIR DUCT KIT
00	0	TPN1131A	POWER SUPPLY HIGH VOLTAGE
00		TPN1132A	POWER SUPPLY LOW VOLTAGE
		TRN5345A	STATION HARDWARE LOW BAND
•		TRN5343A	STATION HARDWARE HIGH BAND
		TLN5703A	TRANSFORMER, KIT (POWER SUPPLY 250 W)
0		TLN5704A	TRANSFORMER, KIT (POWER SUPPLY 375 W)
	•	TLN8799A	SERVICE BOARD
0 0		TCN1383A	REMOTE CONTROL CHASSIS
0 0	_	TLN2376A	GUARD TONE DECODER MODULE
• •	-	TLN4658A	F1 CONTROL MODULE
		TRN4853A	TRANSMITTER SITE INTERFACE MODULE
00	==	TRN4854A/B	STATION CONTROL MODULE
0 0		TRN4856B	DIGITAL MODULATION MODULE
$\overline{}$	0 0	TRN4859A	LINE DRIVER MODULE
-	00	TPN1195A	POWER SUPPLY; 24 V
\rightarrow		TRN5480A	SYNTHESIZER HARDWARE
		TRN5481A	PROM
		TLD2593A	SYNTHESIZER
	0	TLB1560A	SERIES SYNTHESIZER
	<u> </u>		

EXCITER/DRIVER

MODEL CHART

FOR

PURC RADIO PAGING STATIONS

CODE:

FREQ. RANGE 30-50 MHz 136-174 MHz

MODEL TLB1550A TLD2580A

- ONE SUPPLIED
- = INDICATES A MODEL SERIES

	ITEM	DESCRIPTION		
	TLD1950A	POWER AMPLIFIER & HEAT SINK		
	TFD6100A	HARMONIC FILTER		
0	TLD5090A	POWER AMPLIFIER		
	■TLD5320A	EXCITER		
	TFD6110A	EXCITER FILTER		
	TKN6569A	TRANSMITTER RF CABLE		
	TLD5100A	POWER CABLE		
	TLN5169A	SWITCH & CABLE		
	TLN5074A	TERMINAL BRACKET		
	TLN5741A	TRANSMITTER CHASSIS & HEAT SINK		
	TRN5148A	TRANSMITTER HARDWARE		
	TLN4729B	INTERCONNECT BOARD		
	TLB1470A	POWER AMPLIFIER & HEAT SINK		
	TLB8150A	POWER AMPLIFIER		
	■TLB8170A	EXCITER		
	TFB6020A	LOW PASS FILTER		
	TKN6569A	TRANSMITTER RF CABLE		
	TKN6580A	POWER AMPLIFIER CABLE		
	TLB6940A	POWER CONTROL BOARD		
	TLN5170A	TRANSMITTER METER SWITCH & CABLE		
	TLN5740A	CAPNETWORK		
	TRN6423A	RF CONNECTOR		
	TRN6167A	TRANSMITTER CHASSIS & HEAT SINK		
	TLN5075A	BRACKET		
	TRN5417A	TRANSMITTER HARDWARE		
0	NOTE 1*			
	- NOTE 2*			

*NOTES:

 KITS PERTAINING TO THE TLD2580A EXCITER CAN BE LOCATED IN THE MICOR UPRIGHT BASE & REPEATER (RT) STATIONS INSTRUCTION MANUAL (68P81022E90).

EPS-34622-0

 KITS PERTAINING TO THE TLB1550A EXCITER CAN BE LOCATED IN THE MICOR UPRIGHT BASE & REPEATER (RT) STATIONS INSTRUCTION MANUAL (68P81022E95).

MODEL CHART

FOR

LOWBAND/HIGHBAND

PURC RADIO PAGING STATIONS

CODE:

STATION TYPE

SYNTHESIZED
NON-SYNTHESIZED
SYNTHESIZED
NON-SYNTHESIZED

	SYN	200	SYN	ON		LOWBAND/HIGHBAND
CHERALING FREQUENCY	Hz	Hz	//HZ	MHz		PURC RADIO PAGING STATIONS
5	30-50 MHz	30-50 MHz	32-174 MHz	32-174 N		
2	30-	30-	132-	132-		
CHERY					CODE:	
ļ	1A	6A	1A	106A		SUPPLIED UENCY SENSITIVE COMPONENT
NODEL L	C71JZB1101	C71JZB1106/	C73JZB1101A			ATES A MODEL SERIES
2	1721	17ZE	3JZF	C73JZB1		
4	Ö	C)	C	O.		
+	•	•		Н	KXN1116AA	DESCRIPTION CHANNEL ELEMENT (20 PPM TRANSMIT)
1			•	8	KXN1018C	CHANNEL ELEMENT (2 PPM TRANSMIT)
-+	_		_		TCN1381A	REPEATER CONTROL CHASSIS
+	•	<u> </u>			THN6318A TKN6581A	CABINET
+	•	•	•		TKN6582A	RF CABLE RF CABLE
	•	•	•		TKN6883A	REPEATER CABLE
	•	0	•		TKN6918A	CABLE KIT (USED ON TRANSMIT ONLY STATIONS)
+	•	片	•	님	TKN8214A TKN8284A	MODEM CABLE MODULATOR CABLE
(0	Ö			TLB1400A	POWER AMPLIFIER
ŀ	X	X			TLB1412C	POWER AMPLIFIER, 100 W (30-36 MHz)
1	Å	×		Ц	TLB1413C	POWER AMPLIFIER, 100 W (36-42 MHz)
-			$\overline{}$	ᅱ	TLB1414C TLD1690D	POWER AMPLIFIER, 100 W (42-50 MHz) POWER AMPLIFIER
+	1		X	Ă	TLD1692D	POWER AMPLIFIER, 100 W (132-150.8 MHz)
			×	X	TLD1693E	POWER AMPLIFIER, 110 W (150.8-162 MHz)
1		_	×	X	TLD1694E	POWER AMPLIFIER, 110 W (162-174 MHz)
	귉		=		TLB1560A TLB1562A	SYNTHESIZER SYNTHESIZER (30-36 MHz)
1					TLB1563A	SYNTHESIZER (36-42 MHz)
	×		-		TLB1564A	SYNTHESIZER (42-50 MHz)
+	+	\dashv	X	À	TLD2061A TLD2062A	EXCITER AND FILTER BOARD (132-150.8 MHz) EXCITER AND FILTER BOARD (150.8-174 MHz)
t	7		ê	A	TLD2593A	SYNTHESIZER
(Q			TLB8270A	EXCITER
7		×			TLB8272A	EXCITER (30-36 MHz)
		A	-	\dashv	TLB8273A TLB8274A	EXCITER (36-42 MHz) EXCITER (42-50 MHz)
K					TLN2376A	GUARD TONE DECODER MODULE
1		•			TLN4290B	AUDIO PA MODULE
K			×	읭	TLN4658A TLN5902A	F1 CONTROL MODULE TRANSMITTER SHIELD KIT
+			ă	_	TLN5902A	RECEIVER SHIELD KIT
1	•				TLN5914A	RECEIVER SHIELD KIT
+		•		= 1	TLN8799A	SERVICE BOARD
1	긤	•		9	TPN1110B TPN1195A	POWER SUPPLY POWER SUPPLY, 24 V
1		•	5		TRN4853A	TRANSMITTER SITE INTERFACE MODULE
K		Ŏ		$\overline{}$	TRN4854A/B	STATION CONTROL MODULE
1	-	•	-		TRN4856B	DIGITAL MODULATOR MODULE
1		•	-		TRN4859A TRN5342A	LINE DRIVER MODULE STATION HARDWARE, HIGH BAND
1		_	•	7	TRN5344A	STATION HARDWARE, LOW BAND
-	_	Ŏ	•	•	TRN5359A	AC JUNCTION BOX
+	9	+		1	TRN5480A	SYNTHESIZER HARDWARE
K	9		•		TRN5481A TRN6006A	AUDIO AND SQUELCH BOARD, 10 W
1		-		1	TRN6007A	AUDIO AND SQUELCH BOARD, 10 W
					TRN6423A	RF CONNECTOR
(•	•	•	TRN8686A	SERVICE BOARD CARD PULLER
a il						

CONTROL CHASSIS FREG. RANGE **MODEL CHART** 30-50 MHz and 132-174 MHz 450-512 MHz **FOR PURC RADIO PAGING STATIONS** MODEL TCN1381A TCN1382A CODE: = ONE SUPPLIED ITEM DESCRIPTION TRANSMITTER REPEATER INTERCONNECT BOARD TLN5645A TLN5646A RECEIVER REPEATER INTERCONNECT BOARD TRANSMITTER REPEATER INTERCONNECT BOARD TLN5894A TRN4860A INTERCONNECT BOARD CHASSIS HARDWARE TRN5436A TRN5437A CHASSIS HARDWARE EPS-35258-O

INCY STATION TYPE	SYNTHESIZED	NON-SYNTHESIZED	SYNTHESIZED	NON-SYNTHESIZED	MODEL CHART FOR UHF PURC				
OPERATING FREQUENCY	450-512 MHz	450-512 MHz	450-512 MHz	450-512 MHz	RADIO PAGING STATIONS				
MODEL	B84JZB1101A	B84JZB1106A	C64JZB1101A	C64JZB1106A	🛊 = FRE	E SUPPLIED EQUENCY SENSITIVE COMPONENT ICATES A MODEL SERIES			
					ITEM	DESCRIPTION			
	•	-	•	_	KXN1052A	CHANNEL ELEMENT (TRANSMIT)			
\rightarrow	-	\rightarrow	•	◘	TCN1382A	CONTROL CHASSIS			
		•		片	THN6373A	HOUSING			
			<u>.</u>	=	THN6318A TKN6804A	HOUSING CABLE, 75 W			
	•	•		ĭ	TKN8007A	CABLE HIGH POWER REPEATER			
	•	•			TKN8008A	CABLE, INTERCONNECT			
	•	•	•		TKN8214A	CABLE, MODEM			
4		Q	Į	Q	TKN8284A	CABLE, MODULATOR			
_ (Q	Ò	Q	Q	TLE1600B	HYBRID AMPLIFIER/TRIPLER			
-[A	X	A	X	TLE1603B TLE1604B	HYBRID AMPLIFIER/TRIPLER (450-470 MHz)			
	A	A	X	X	TLE1605B	HYBRID AMPLIFIER/TRIPLER (470-494 MHz) HYBRID AMPLIFIER/TRIPLER (494-512 MHz)			
	3		Õ.	ô	TLE1670B	NETWORK ANTENNA REPEATER			
	X	X	X	X	TLE1673B	NETWORK, ANTENNA REPEATER (450-470 MHz)			
		À	À	À	TLE1674B	NETWORK, ANTENNA REPEATER (470-494 MHz)			
	X	×	×	X	TLE1675B	NETWORK, ANTENNA REPEATER (494-512 MHz)			
7	*	×		4	TLE1693A	POWER AMPLIFIER, 20 W (450-470 MHz)			
-	Â	X		_	TLE1694A	POWER AMPLIFIER, 20 W (470-512 MHz)			
+	+	-	A	A	TLE1713A TLE1714A	POWER AMPLIFIER, 75 W (450-470 MHz) POWER AMPLIFIER, 60 W (470-512 MHz)			
(\supset		S	റി	TLE1720B	EXCITER AND FILTER BOARD			
,	X	X	X	X	TLE1723B	EXCITER AND FILTER BOARD (450-470 MHz)			
	X	X	A	X	TLE1724B	EXCITER AND FILTER BOARD (470-494 MHz)			
			A	\star	TLE1725B	EXCITER AND FILTER BOARD (494-512 MHz)			
-	7	7		4	TLE1930A TLE1933A	POWER AMPLIFIER (450-470 MHz)			
-17	Ŋ	Ž	-	-	TLE1934A	POWER AMPLIFIER (470-494 MHz)			
,		*		-	TLE1935A	POWER AMPLIFIER (494-512 MHz)			
		ار بيفاي		T	TLE2273A	SYNTHESIZER, 450-512 MHz			
(-			TLE4183A	TRANSMITTER SHIELD KIT			
_	_				TLN1997A	METERING/INTERCOM KIT			
	_				TLN2376A TLN4290B	GUARD TONE DECODER MODULE AUDIO PA MODULE			
	-	ă			TLN4658A	F1 CONTROL MODULE			
ľ			=		TLN4296A	POWER CONTROL			
					TLN4296AV	POWER CONTROL			
_		\rightarrow	4	4	TLN5697A	METER PANEL			
				늬	TLN5703A	TRANSFORMER			
	4				TLN8799A TPN1110B	POWER SUPPLY			
	3	-		4	TPN1167A	POWER SUPPLY, LOW VOLTAGE			
_		_		1	TPN1168A	POWER SUPPLY, HIGH VOLTAGE			
	Ď	$\overline{}$			TPN1195A	POWER SUPPLY, 24 V			
					TRN4853A	TRANSMITTER SITE INTERFACE MODULE			
_	_		_	_	TRN4854A/B	STATION CONTROL MODULE			
					TRN4856A/B TRN4859A	DIGITIAL MODULATOR MODULE LINE DRIVER MODULE			
	1				TRN5117A	STATION HARDWARE UHF			
1				+	TRN5118A	STATION HARDWARE UHF HIGH POWER			
_	đ	_		1	TRN5198A	SYNTHESIZER HARDWARE			
_					TRN5481A	PROM			
	1	_	_	•	TRN5359A	AC JUNCTION BOX			
				의	TRN6006A	AUDIO AND SQUELCH BOARD, 10 W			
	-	-	4	믦	TRN6193A TRN6194A	RECEIVER SHIELD, 75 W			

TRN6194A

TRN8580A

TRN8584A ● TRN8686A RECEIVER SHIELD

AC JUNCTION BOX

BLOWER SERVICE BOARD CARD PULLER



SAFE HANDLING OF CMOS INTEGRATED CIRCUIT DEVICES

Many of the integrated circuit devices used in communications equipment are of the CMOS (Complementary Metal Oxide Semiconductor) type. Because of their high open circuit impedance, CMOS ICs are vulnerable to damage from static charges. Care must be taken in handling, shipping, and servicing them and the assemblies in which they are used.

Even though protection devices are provided in CMOS IC inputs, the protection is effective only against overvoltage in the hundreds of volts range such as are encountered in an operating system. In a system, circuit elements distribute static charges and load the CMOS circuits, decreasing the chance of damage. However, CMOS circuits can be damaged by improper handling of the modules even in a system.

To avoid damage to circuits, observe the following handling, shipping, and servicing precautions.

1. Prior to and while servicing a circuit module, particularly after moving within the service area, momentarily touch both hands to a bare metal earth grounded surface. This will discharge any static charge which may have accumulated on the person doing the servicing.

NOTE

Wearing Conductive Wrist Strap (Motorola No. RSX-4015A) will minimize static buildup during servicing.

- 2. Whenever possible, avoid touching any electrically conductive parts of the circuit module with your hands.
- 3. Normally, circuit modules can be inserted or removed with power applied to the unit. However,

check the INSTALLATION and MAINTENANCE sections of the manual as well as the module schematic diagram to insure there are no objections to this practice

- 4. When servicing a circuit module, avoid carpeted areas, dry environments, and certain types of clothing (silk, nylon, etc.) because they contribute to static buildup.
- 5. All electrically powered test equipment should be grounded. *Apply* the *ground lead* from the test equipment to the circuit module *before* connecting the *test probe*. Similarly, *disconnect* the *test probe prior* to removing the *ground lead*.
- 6. If a circuit module is removed from the system, it is desirable to lay it on a conductive surface (such as a sheet of aluminum foil) which is connected to ground through 100k of resistance.

WARNING

If the aluminum foil is connected directly to ground, be cautious of possible electrical shock from contacting the foil at the same time as other electrical circuits.

- 7. When soldering, be sure the soldering iron is grounded.
- 8. Prior to connecting jumpers, replacing circuit components, or touching CMOS pins (if this becomes necessary in the replacement of an integrated circuit device), be sure to discharge any static buildup as described in procedure 1. Since voltage differences can exist across the human body, it is recommended that only one hand be used if it is necessary to touch pins on the CMOS device and associated board wiring.



1301 E. Algonquin Road, Schaumburg, IL 60196

- 9. When replacing a CMOS integrated circuit device, leave the device in its metal rail container or conductive foam until it is to be inserted into the printed circuit module.
- 10. All low impedance test equipment (such as pulse generators, etc.) should be connected to CMOS
- device inputs after power is applied to the CMOS circuitry. Similarly, such low impedance equipment should be disconnected before power is turned off.
- 11. Replacement modules shipped separately from the factory will be packaged in a conductive material. Any modules being transported from one area to another should be wrapped in a similar material (aluminum foil may be used). NEVER USE NON-CONDUCTIVE MATERIAL for packaging these modules.

Communications Group

INTRODUCTION

- PURC (Paging Universal Remote Control) Radio Paging Stations consolidate binary and sequential tone signaling control functions which are required in paging systems. PURC Radio Paging Stations accommodate 2-tone and 5/6-tone paging formats (either tone only or tone and voice) as well as binary formats. Binary paging requires FSK-NRZ (frequency shift keying with non-return to zero) signaling.
- There are two modes of operation for PURC Radio Paging Stations:
- audio mode corresponds to commonly used 2-tone or 5/6-tone pager addressing methods (for tone only or tone and voice pagers).

- binary mode used in display paging and certain types of binary and voice pagers (binary address followed by voice message).
- 1.3 Control of *PURC* Radio Paging Stations can be accomplished locally (requires multiple paging terminal to base station connections) or remotely (requires one simplex control path). Remote control is required for distances greater than 100 feet. The following discussion refers to remote control operation.

STATION CONTROL

Regardless of whether the binary mode or audio mode of operation is selected, the station control sequence is initiated by 120-140 ms (milliseconds) of high

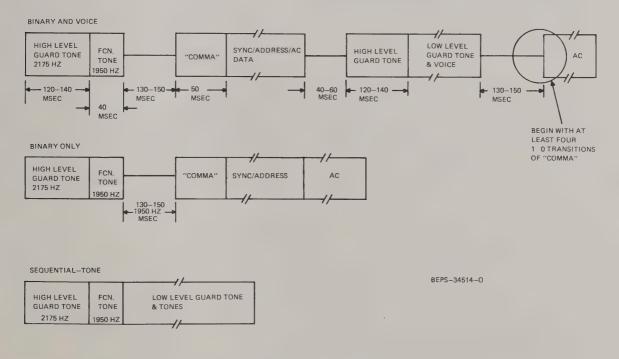


Figure 1. Single Transmitter Sequential Tone Control Format

technical writing services

DESCRIPTION

level guard tone (2175 Hz) followed by 40 ms of function tone (1950 Hz). This sequence keys the base station through control signals originating in the guard tone decoder, F1 control, and station control modules. The rest of the control sequence depends on the type of information, binary or audio, to be transmitted.

3. BINARY CONTROL

(See Figure 1, Binary Only)

3.1 After the guard tone/function tone sequence, binary control is accomplished by a 130-150 ms pause before sending the binary information. This allows the guard tone decoder to drop out and un-inhibit the modem in the station. During the 130-150 ms pause, the transmitter remains keyed by the delayed keyed A + voltage from the digital modulator module. After the pause but before the station drops off the air, binary information is send to the station. This information (binary preamble) must begin with 50 ms of an alternating binary 1,0 pattern (comma) received at 600 bps (bits per second). This binary information from the paging terminal is sent to the station via 1200/2200 Hz audio frequency shift signaling (modem tones). A

modem in the paging station decodes the modem tones into logic "1" and "0" dc states. These logic states are level shifted in the transmitter site interface and digital modulator modules for application to the modulator stage in the transmitter. Detection of a 1200 Hz tone is defined as a logic 1 and gives a positive shift to the transmitter carrier frequency. Detection of a 2200 Hz tone is defined as a logic "0" and gives a negative frequency shift to the transmitter carrier frequency.

3.2 The detection of the initial 600 bps binary pattern is immediately converted by the modem and TSI (Transmitter Site Interface) module into a modem PTT signal. This results in the station remaining keyed by reverting to the binary mode (FSK-NRZ). When the station has been properly set up in the binary mode, binary data is transmitted. The transmitter unkeys within 350 ms after the modem tones stop. During the time the station is in the binary mode, the modem PTT signal is routed to the guard tone decoder module to inhibit the audio mode. Therefore the binary and audio modes are independent of each other.

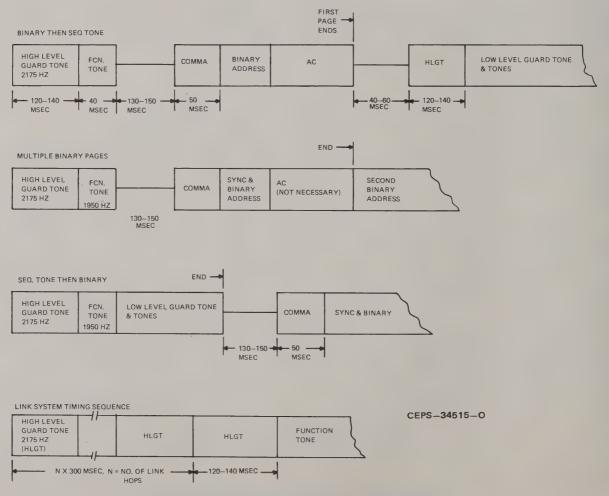


Figure 2. Sequential Tone/Binary Mixed Pager
Tone Control Format

4. AUDIO CONTROL

(See Figure 1 Single Transmitter Sequential Tone Control Format)

- 4.1 After the initial guard tone function tone sequence, audio control is accomplished by sending low level guard tone without any delay after the function tone. The transmitter keys up and the desired paging tones and voice (if required) are then transmitted. Low level guard tone is present during the entire transmission to keep the transmitter keyed. When low level guard tone is removed, the station unkeys within approximately 350 msec. The continuous detection of low level guard tone keeps the modem in the station muted via a relay in the TSI (Transmitter Site Interface) module.
- 4.2 High level guard tone and function tone are sent at +5 dB and -5 dB respectively, referenced to test tone (test tone is the level of 1000 Hz requires to modulate the transmitter ±3 kHz). Low level guard tone is sent out at a level -25 dB referenced to test tone.

5. **COMBINED BINARY AND AUDIO CONTROL** (See Figure 1 and Figure 2)

5.1 A combination of binary and audio control is required for paging in systems with mixed binary and tone signaling, or where tone and voice pagers are used which require a binary address. To initially establish control of the station, high level guard tone and function tone is required as previously described (paragraph 2). Binary or audio control is then established as previously described (paragraphs 3 and 4). If the audio mode is first established and it is desired to switch to the binary mode, a pause of 130-150 ms is sent by the terminal to allow the station to drop out of the audio mode. Binary information is sent out, beginning with 50 ms of comma (alternating 1 and 0 pattern). The remainder of the binary information follows the comma. If multiple binary paging (without voice message) is requried, the binary data must be sent without any pauses to prevent the station from unkeying.

5.2 To switch from the binary mode to the audio mode, a 50 ms pause is sent to allow the station to drop out of the binary mode (loose modem PTT signal). High level guard tone is sent by the paging terminal for 120-140 ms followed immediately by the low level guard tone. The function tone (1950 Hz) is not required. Paging tones or voice is then sent to the station along with continous low level guard tone. To switch back to the audio mode requires a 130-150 ms pause followed by binary information. In the audio mode loss of low level guard tone results in the station unkeying within 350 msec, provided no other information is sent to the station. Similarly, for the binary mode, the station will unkey within 350 msec after modem tones have ended (as sent by the terminal).

6. MULTIPLE PAGE TIMING

Once the station is successfully keyed in either the audio or binary mode, multiple pages of any format may be sent by adhering to the timing required for the audio mode, binary mode, or alternating between audio and binary modes. If paging activity has stopped for more than 160 msec between successive pages to be transmitted, the paging terminal must send a high level guard tone and function tone (1950 Hz) sequence before access to either the audio or binary mode can be determined.

7. LINK STATION TIMING

(See Figure 2 last figure)

When rf control links are used instead of telephone lines, the initial high level guard tone must be extended to insure each transmitter is up to full power and each link receiver is unsquelched. To insure that this condition exists, and additional 300 ms of high level guard tone is sent out for each link (hop).





Communications Sector

JUMPER OPTIONS AND TRANSMIT AUDIO LEVEL SETTING

1. JUMPER OPTIONS

The following jumper information is provided to indicate jumper applicability in various *PURC* Radio Paging Stations.

1.1 RECEIVE AUDIO AND SQUELCH BOARD (OPTIONAL)

Jumper	Carrier Squelch	Tone PL Squelch	Digital PL Squelch
JU201	IN	OUT	IN
JU202	38 8 IN 93	OUT	E TAR IN TRACE
JU203	IN*	IN*	1N* (1)
JU204	Jack IN S.	IN**	₩**

^{*} IN for 10 W audio

1.2 EXCITER

			Options
Jumper	Pre- Emphasis	Flat Audio	VAR
JU401	OUT	OUT	OUT
"JU402"	OUT	IN	S CONTRACTOR IN
R401	OUT	OUT	OUT
R402, 3	IN	OUT	OUT
R405	OUT*	OUT*	OUT*

^{*} IN for PL input on Exciter pin 5

1.3 RECEIVER INTERCONNECT BOARD

For full duplex operation on the TLN6196A model board, remove CR957.

1.4 DIGITAL PL SQUELCH DECODER BOARD

Jumper	Normally
JU801	IN
JU802	OUT
JU803	OUT PART AND A STATE OF

1.5 FLAT AUDIO BOARD (OPTION)

Jumpe	r Low Band	Mid Band	VHF	UHF	900
JU1	OUT	IN	OUT	OUT	IN
JU2	IN IN	OUT	IN	IN	OUT
JU3	OUT	OUT	OUT	OUT	IN
JU4	OUT	IN	OUT	OUT	OUT
JU5	a Karanin in is en	OUT	OUT	IN	OUT
JU6	Soft New OUT: The	OUT	IN	OUT	OUT
JU7	in in	in .	IN	· IN	OUT
JU8	in en	IN	IN	IN	OUT
JU9	OUT	OUT	OUT	OUT	IN
JU10	IN FOR	ONLY FLAT	`AUDIO	OPTION	

1.6 F1 CONTROL MODULE

	Part or Jumper	Normal Condition
	JU1	NOT USED
1.00	JU2	IN
£	JU3	OUT (in on TLN4638A)
7	C23	IN (out with co-located link receiver)
	C32	IN (out with co-located link receiver)

1.7 VOICE ACTUATED RESPONSE (VAR) OPTION

JUMPER		
JU1	OUT	
JU2	IN	Select Normal Trigger Sensitivity
JU3	IN	•
		Hang Times

			1 sec	0.5 sec Nominal	50 ms
\$ 1000 to \$5000	JU4		OUT	OUT	OUT
	JU5		OUT	OUT	IN
	JU6		OUT	OUT	IN
	JU7		OUT	IN	IN
	JU8	Normally IN	OUT	for C42JZ	B Link Station

^{**} cut for "and squelch"

1.8 TRANSMITTER SITE INTERFACE MODULE (MODEL TRN4853A)

Jumper	Normal Condition	Special Applications
JU1	OUT	IN for signal detect key-up
JU2	IN	OUT for inverted data
JU3	OUT	IN for inverted data
JU4	IN 1	OUT for 387 Hz verification
JU5	IN	OUT when negative voltage module is used
JU6	OUT	IN when modem is removed
JU7	NOT USED	
JU8	IN	OUT when negative voltage module is used

1.9 DIGITAL MODULATOR MODULE (MODEL TRN4856B)

The following components must be removed depending on the quiescent output voltage of the channel element.

Voltage	Components	
3.98 V - 4.5 V	Remove R24, VR2	
4.50 V - 5.0 V	Remove R24, R25, VR2	
5.00 V - 5.5 V	Remove R11, R24, R25, VR2	
7.80 V - 8.2 V	Remove R25, VR1	
8.2 V - 8.5 V	Remove R11, R25, VR1	

1.10 STATION CONTROL MODULE (MODEL TRN4854B)

Jumper	Normal Condition	Special Applications
JU1	IN	OUT for special applications
JU2	IN .	OUT for special applications
JU3	IN.	OUT for special applications
JU4	IN	OUT for guard tone or modem
		keying with a land to the land to the land
JU5	IN	OUT for special applications
JU6	IN.	OUT for duplex stations
JU7	OUT	IN for PL squelch
JU8	IN	OUT when simulcast control
NA. D		module used

Note: Remove Q12 when using simulcast control module.

1.11 LINE DRIVER MODULE (MODEL TRN4859A)

Jumper	Normal Condition	Special Applications
JU1	NOT USED	
JU2	NOT USED	
JU3	OUT	IN for 2-wire stations
JU4	OUT	IN for 2-wire stations
JU5	NOT USED	
JU6	NOT USED	
JU7	IN	OUT for special applications
JU8	IN	OUT for special applications
JU9	IN	OUT for special applications
JU10	OUT	IN for revr line levels of xr-10 dBm
R21	IN	OUT for 2-wire stations
R55	OUT	IN for non-binary stations

1.12 UNIFIED REMOTE CONTROL BOARD (MODEL TRN4860A)

Jumpe	Norma Condition	Special Applications
JU1	OUT	IN to remove xmit notch
JU2	> ^> OUT	IN for guard-tone only or modem keying
JU3	*** *	OUT for non-pre-emphasized xmit audio
JU4	OUT	IN for flat xmit audio
JU5	OUT	IN when using var module
JU6	OUT	IN to remove receive notch
JU7	Court OUT	IN for non-binary paging applications or non-PL link ap-
		plications of non-FL link ap-

1.13 NON-UNIFIED REMOTE CONTROL BOARD (MODEL TRN5349A)

	Normal	
Jumper	Condition	Special Applications
JU1	OUT	IN to remove xmit notch
JU2	OUT	IN for guard tone only or modem keying
JU3	in .	OUT for non-pre-emphasized xmit audio
JU4	OUT	IN for flat xmit audio
JU5	OUT	IN when using var module
JU6	OUT	IN to remove receive notch
JU7	OUT	IN for non-binary paging or non-PL link applications
1018	OUT	NOT USED
JU9	OUT	IN when using T.O.T option
JU10	OUT	IN for C42JZB link xmtrs
JU11	OUT 4	IN when using T.O.T option
JU12	OUT	IN for C42JZB link xmtrs
JU13	OUT 1	IN when using negative voltage module
JU14	OUT	IN For C42JZB link xmtrs
JU15		OUT when using simulcast control
TITLE	OI ITT	module
JU16	OUT	IN for C42JZB link xmtrs

1.14 GUARD TONE DECODER (MODEL TRN4892A)

Jumper	Normal Condition	Special Application
R91	· IN	OUT for link receivers with zero dBm link level

2. TRANSMIT AUDIO LEVEL SETTING

NOTE

If station is used without a modem, add jumper JU6 to the TRN4853A Transmitter Site Interface module. JU6 provides a 600 ohm input to the module.

2.1 MAXIMUM DEVIATION CAPABILITY

With 1 volt RMS of 1 kHz audio at the exciter level input on the line driver module, increase transmitter deviation by rotating the exciter IDC control. Transmitter shall be capable of acheiving the maximum deviation specified limit without evidence of modulation break up.

2.2 SET MAXIMUM DEVIATION

Step 1a. Pre-emphasize audio only - with modulation as in paragraph 2.1, adjust exciter IDC control for ± 5 kHz total deviation.

Step 1b. Flat audio only (TRN5348A only) - with modulation as in paragraph 2.1. Adjust flat audio IDC control fully clockwise. Adjust exciter IDC control for ± 5 kHz total deviation.

Step 2. Voice Actuated Response (VAR) both flat and pre-emphasized - disable VAR and set switch to FLAT.

Step 3. With modulation per paragraph 2.1, adjust exciter IDC control for ± 5 kHz total deviation.

2.3 EXCITER AUDIO SENSITIVITY

Reduce the input level for 60% of rated deviation. Record the audio voltage at XCTR LEVEL jack on line driver module.

2.4 TRANSMIT LINE LEVEL

NOTE

If the station has a VAR module, it must be disabled and set to the flate mode.

Step 1a. Apply a 1 KHz test tone into the station on the 600 ohm line terminals and adjust the XCTR LEVEL control on the line driver module for ± 3 kHz deviation.

Step 1b. With the VAR option, and the same modulation as in Step 1a, adjust the XCTR LEVEL control on the VAR module for ± 3 KHz deviation, with the VAR module disabled and set to the PRE-EMPHASIZED mode.

Step 2. Re-enable VAR module when above adjustments are completed.

3. FREQUENCY SHIFT KEYING (FSK) DEVIATION

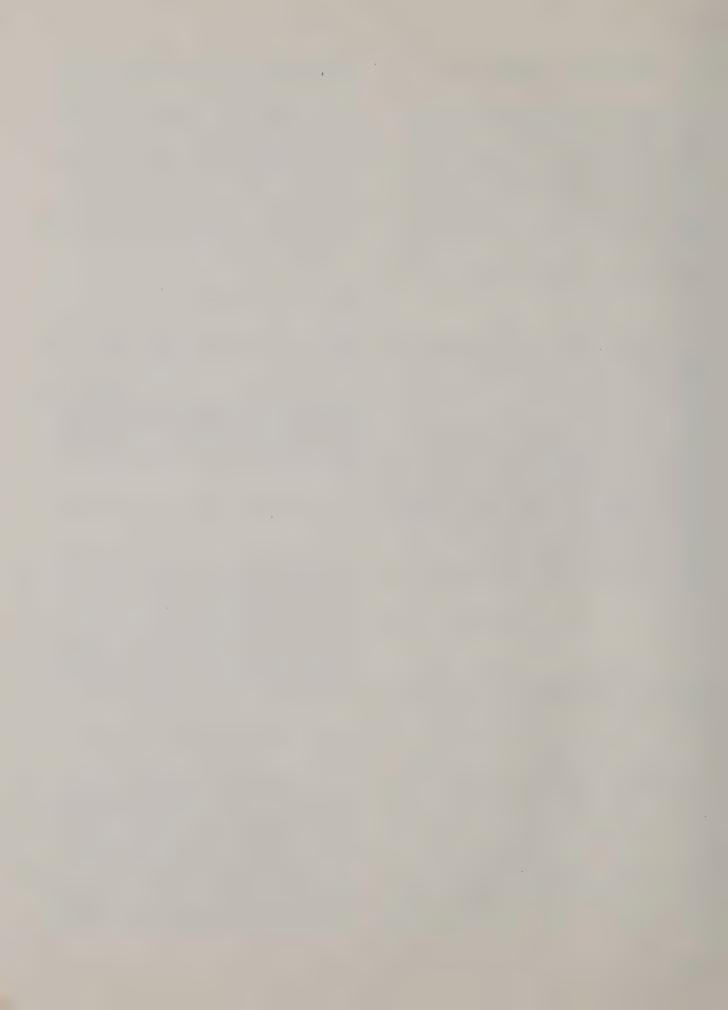
Step 1. Line disable the station via switch on station control module.

Step 2. Set the T.S.I. test switch to the TEST position, and place the DEVIATION switch to the + position. The binary deviation can be read as the output frequency (fo) minus the carrier frequency (fc).

Step 3. Adjust the + DEVIATION control on the digital modulator module until fo-fc equals +4.0 kHz.

Step 4. Place the DEVIATION switch to the -position and adjust the -DEVIATION control for fo-fc equals -4.0 kHz.

Step 5. Return the TEST switch to its normal position.



```
FUNC
         JU4 & ADD R21 (LINE DRIVER).
The stand (TSI) OR R55 (LINE DRIVER).
tone/fu ADD JU2 (INTERCONNECT BRD).
The gus jut is removed from interconnect
transfor
module
Line PT VOLTAGE MODULE, REMOVE JUS & JUS
tion CO187 HZ VERIFICATION.
dow, the JUMPERED FOR:
pass furrion
A line In
trol move to the TSI MODULE.
binary r
Transm
The F1
ground
these lin
          TS I MUST BE ADDED IN ORDER TO PROVIDE
Channe
enable
keyed A
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(FSK-N

Station Block Diagram Motorola No. PEPS-34628-A 10/5/82 - V & G



FUNCTIONAL DESCRIPTION

The station is first keyed up in the audio mode by guard If a voice message follows the binary information, tone/function tone (2175 Hz and 1950 Hz, respectively). another delay allows for the loss of modem PTT, then The guard tone is coupled from the line by line driver high level guard tone is again used to obtain line PTT. transformer, T1, and routed to the guard tone decoder Once the station is keyed in the tone mode the voice (or module. The guard tone decoder module generates a paging tones in a tone system) is sent with the low level Line PTT upon detection of the 2175 Hz signal. The station control module then opens the function tone window, thus allowing the guard tone decoder module to low level guard tone. Thus preventing it from being pass function tones and enabling the tone decoders.

trol module and prevents the station from entering the modulating the channel element. binary mode by removing the modem via relay K1 in the Transmitter Site Interface (TSI) module.

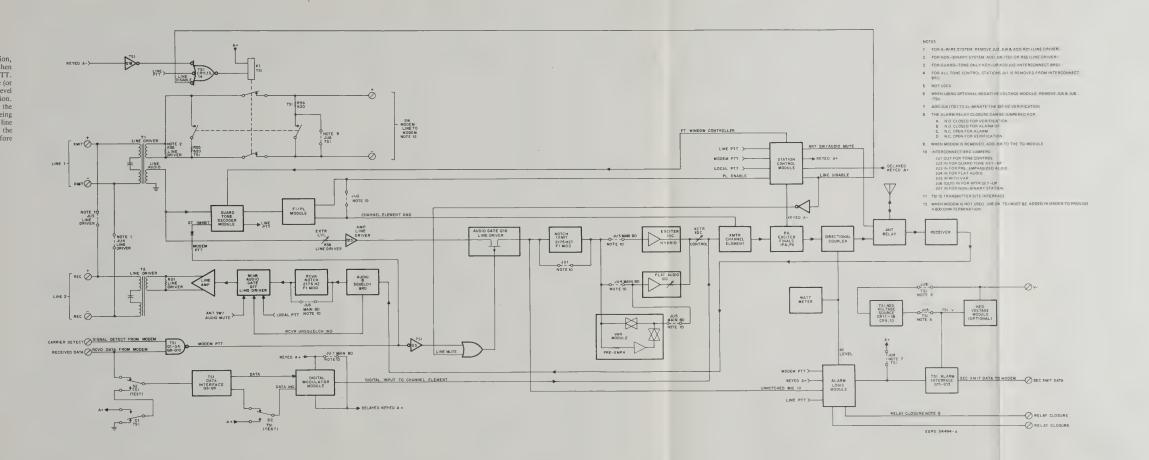
The F1 Control Module produces an F1 channel element ground and PL enable with the detection of 1950 Hz. these lines are latched until the station un-keys.

Channel element ground turns on the element and PL enable allows the station control module to generate keved A-, provided either keved A+ or delayed keyed A + is present. Keyed A- closes the function tone window and biases the final rf stages in the transmitter bringing the station up to full power.

After the function tone there is a delay of 130-150 milliseconds, which allows for the loss of line PTT. Keyed A + is removed by the loss of the PTT signal, but delayed keyed A + remains for an additional 160-200 milliseconds, preventing the station from un-keying during tone-binary or binary-tone transitions.

If the station is keyed while line PTT or line disable is not present, relay K1 in the TSI module allows the modern tones to be applied to the modern, again via T1 in the line driver module. The modem then generates carrier detect and received data signals. If the TSI module receives active data (active since the modem considers guard tone as static data) and a carrier detect signal, it generates a modem PTT function. The modem PTT function now replaces line PTT in the keying sequence to keep the station transmitter keyed. The modem PTT is used to open the transmit audio path in the line driver so the modem tones do not modulate the carrier. In addition, the guard tone decoder is disabled by modem PTT, therefore inhibiting line PTT while in the binary mode. The TSI module then passes the data to the digital modulator module which level shifts the data and dc couples it to the channel element, thus producing the frequency shift keying-non-return to zero (FSK-NRZ) output.

transmitted. The audio is routed from T1 in the line driver, through the notch filter and then to either the A line PTT produces keyed A+ from the station con-



Station Block Diagram Motorola No. PEPS-34628-A 10/5/82 - V & G

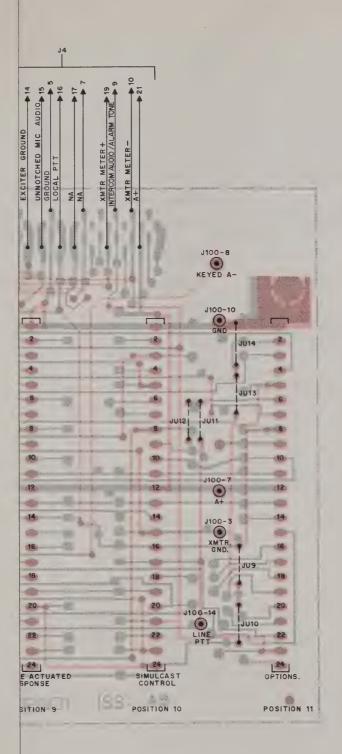
_										
	->	* PL DISABLE	FLAT AUDIO CONTROL	PL DISABLE CONTROL	NA	NA	PL INPUT	Ø Z	REFLECT POWER	NON-SIMUL FUNCT TONE
		23 [*]		20						17
				2						
ľ				21						
									8	
Į										
	8*									
			7*							
					5	6	7	2		
	13				9	11		13		15
		13	26				29			
-										
-	6								1400	
									J100 -13	

HOW TO READ CHART

- This chart shows all interconnections made by the plating on both sides of the interconnect board and by wire jumpers.
- All pin numbers in each vertical column are electrically common (interconnected by circuit board plating).
- 3. To trace interconnections from any starting point to all other common points proceed as follows:
 - Step 1. Find the module position or connector in the left hand column of the chart.
 - Step 2. Find the desired pin number. All pins of a specific connector are listed in the line that extends to the right.
 - Step 3. Note the function of the desired pin. The function is listed at the top of the column in which the pin number appears. All other pins listed in the same function column are interconnected. For each entry in the function column, trace back to the left hand column to find the module or connector number. (See Example.)
 - Step 4. * equals function source.
 - Step 5. NA Not Assigned (Plating exists between points but not used.)

Example:

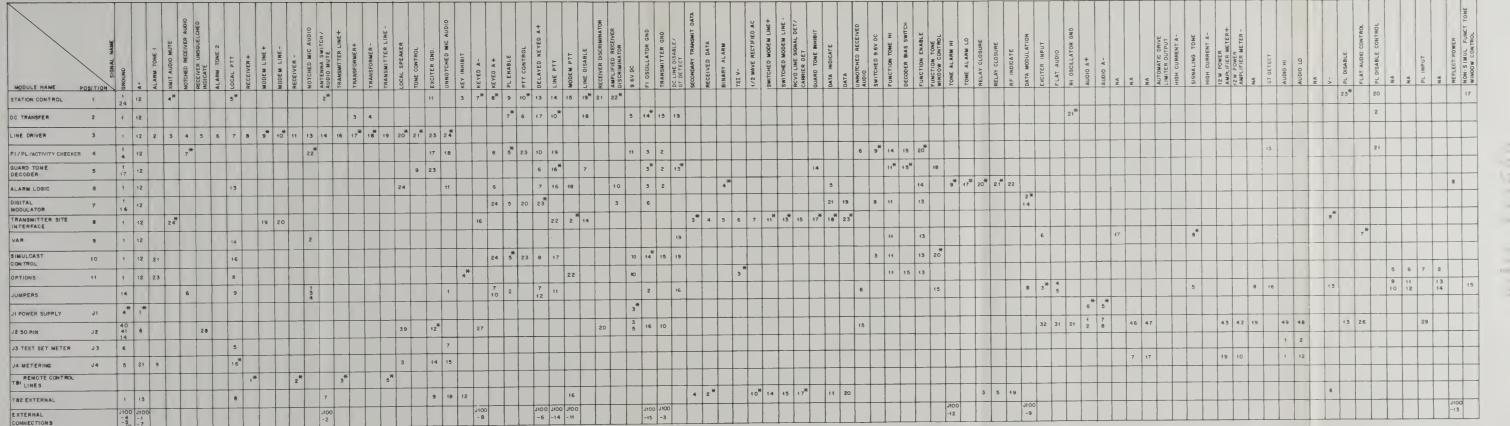
Station control module (position 1 pin 10) has a function of PTT Control which is interconnected to DC Transfer Module (position 2 pin 6), F1/PL Module (position 4 pin 23), Digital Modulator (position 7 pin 20), and Simulcast Control (position 10 pin 23).



NOTE: THESE CONNECTIONS ARE MADE ON NON-SYNTHESIZED STATIONS ONLY,

COMPONENT SIDE BD-EEPS-34456-A SOLDER SIDE BD-EEPS-34457-A OL-EEPS-34458-A

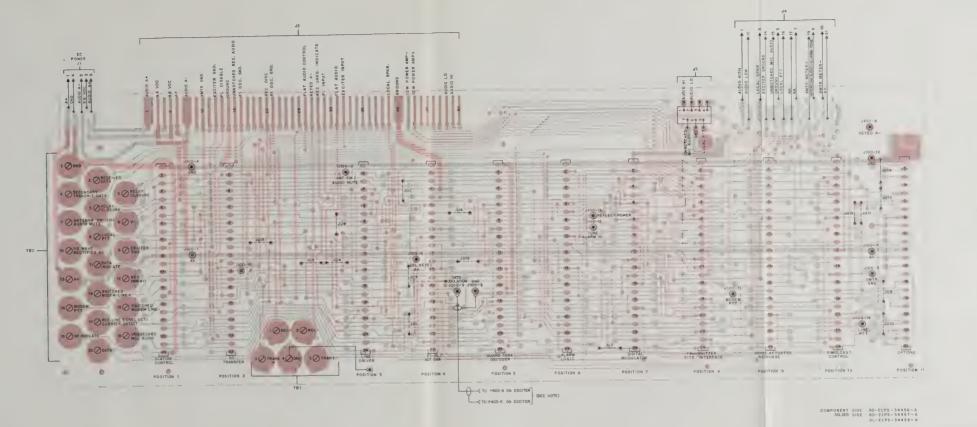
> TRN5349A Non-Unified Remote Control Board Circuit Board Detail & Parts List Motorola No. PEPS-34629-A 10/5/82 - V & G



EEPS - 35131 - A

parts list

REFERENCE	MOTOROLA	DESCRIPTION
SYMBOL	PART NO.	DESCRIPTION
E1, 2, 3, 4	80 83029H01	spark. gap: 230 V = 15%
		connector, receptable:
J3	9-84207B01	lemale 7-contact
	m	echanical parts
	3-84482M01	SCREW, machine insulator, 25 used
	29 83362G01	TERMINAL, 25 used
	29 84028H01	TERM NAL, pluq, 264 used
	39 10184A10	CONTACT, plug 13 used
	28 84269C01	TERMINAL, contact, low profile; 13 used
	28 84259C02	TERM: NAL, c< ntact; high profile, 10 used



SHOWN FROM SOLDER SIDE (REAR OF STATION) MOTE: THESE CONNECTIONS ARE MADE ON NON-SYNTHES ZED STATIONS ONLY.



NOTES:

- 1. These connections are made on non-synthesized stations only.
- 2. CR1 and CR2 used with B84, C35, and C75 station models only.

Jumper Chart

Jumper	Normal	Description
JU1	OUT	IN To Remove Xmit Notch
JU2	OUT	IN For Guard Tone only or Modem Key-Up
JU3	IN	OUT For Non-Preemphasized Xmit Audio
JU4	OUT	IN For Non-Flat Audio
JU5	OUT	IN When Not Using VAR Module
JU6	OUT	IN To Remove Royr Notch
JU7	OUT	IN For Non-Binary Paging Applications and Non-PL Link Applications

HOW TO READ CHART

- This chart shows all interconnections made by the platting on both sides of the interconnect board and by wire jumpers.
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- Stap 3. Note the function of the desired pin. The function is listed at the top of the column in which the pin number appears. All other pins listed in the same function column are interconnected. For each entry in the function column, trace back to the left hand column to find the module or connector number (See Example.)
- Step 4. equals function source.
- Step 5 NA Not Assigned (Plating exists between points but not used.)
- Siep 3 14A 1401 Assigned (Flating exists between points but not u

Example:

Station control module (module position 2), pin 10 has a function of PTT Control, which is interconnected to DC Transfer Module (position 3) pin 6, F1IPL Module (position 5) pin 23, Digital Modulator (position 6) pin 20, and Simulcast Control Module (position 8) pin 23.

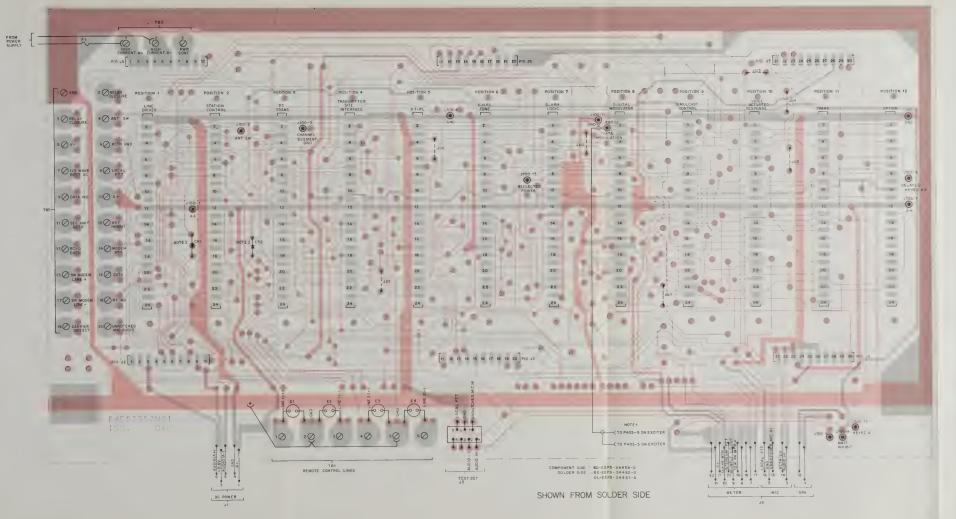
TCN1282A Unified Remote Control Chassis Interconnect Chart Motorola No. EEPS-34673-A 10/5/82 - V & G

											, ,																																																		
MODULE	POSITIO	SIGNAL NAME	GND A+	ALARM TONE 1	NOTCHED RECEIVER AUDIO	INDICATE ONSQUELCHED	LOCALPTT	RECEIVER LINE +	MODEM LINE +	RECEIVER LINE -	ANTENNA SWITCH/ AUDIO MUTE	TRANSMITTER LINE +	TRANSFORMER +	TRANSMITTER LINE -	LOCAL SPEAKER TONE CONTROL	EXCITER GND	UNNOTCHED MIC AUDIO KEY INHIBIT	KEYED A-	KEVED A+	PTT CONTROL	CINE PT1	морем РТТ	LINE DISABLE	AMPLIFIED RECEIVER DISCRIMINATOR	9 8 V DC	F1 OSCII LATOR GND TRANSM:TTER GND	DC LINE DISABLE	SECONDARY TRANSMIT DATA RECEIVED DATA	BINARY ALARM	12WAVE RECTIFIED AC	SWITCHED MODEM LINE +	SWITCHED MUDEM LINE - ROVO LINE SIGNAL DET/ CARRIER DET	GUARD TONE INHIBIT	CATA	OMNOTCHED RECEIVED AUDIO	FUNCTION TONE HI	DECODER BIAS SWITCH	FUNCTION ENABLE FUNCTION TONE WINDOW CONTROL	TONE ALARM HI	TONE ALARM LO	RELAY CLOSURE	AF INDICATE	DATA MODULATION	EXCITER INPUT	SIGNALLING TONES	RI OSCILLATOR GND	AUDIO A-	XMIT INH'BIT	AUTOMATIC DRIVE LIMITER OUTPUT	HIGH CURRENT A+	HIGH CURRENT A 12 W POWER AMPLIFIER MEYER +	12 W GOWER AMPLIFIER METER —	AUDIO LO		PL DISABLE	PL DISABLE CONTROL	P.L. INPUT	REFLECTEO POWER	NA	NA	
LINEDRIVER	1		1 12	2 3			7	e 04	* 10*		14	10 17	* .0%	10. 20	# 21¥	22 0						П						T				\Box		П		\Box	+									+	+		+	+					+		+		+	\vdash	
STATION CONTROL	2		14 12	41			g#:		1.0	11 10	2*	10 17		10 2		23 24				*					\top			†			+		+				+	*	\vdash	+		H			\vdash	+	+-	H	-	+	+1	+	-	H	+		+	+	+	H	
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INTERFACE	4		1 12	24				19	20			+		+			+	16	+	+	22	2*	14	H			31	E 4	5 8	7	11 [#] 13	15	7 th 18 th	23 [#]	+		+		\vdash	+	+	\vdash	+	+		-	+	-	+	+	+	+	+-	8*	-	H	+	\perp	-		
F1/PL	5	-	12	+	7*	+		+	+	22		+	+	+		17 11	3		s*	23 1	0 19		+		11 3		-	+			+	+	+	H	6 8 4	14	15 20	*	\vdash	+	+	-	+	+	\vdash	+	+	\vdash	+	+	++	+	-		+	21					
GUARD TONE DECODER	6		7 12	+	++	+		+	+	+	\vdash	+	+	+	9	23	-	-		-	16		7		3	2	13	+-	1		+	++	4	1		11*	15	18	H	+	+	\vdash	-		Ш	+	+	\sqcup	4	+	++	1			+	Ш	4	\sqcup			L
ALARM LOGIC	7		5 12	+		+	13	+	+-+	+	-		+	2		1	4	+	+-		16	18	+	10	3	2	_	+	4*		-	++	5	-	+	-	14		9* 1	17 20	* 21*	22	_	-	Н	+	-	1	4	+	+-	_			+		8	11	4	4	
DIGITAL MODULATOR	8	_	6 12	+	+	+		+	1	+	1	+		1		_	\perp	2	4 5	20 2	3			3			-	1	-		4	\Box	21	19	8	13	13		Ш	1	+	1	2*			15	1		_	1				4	\perp				_		
SIMULCAST CONTROL	9		1 12	21	-	_	16	-		_		4		4		-		2	5*	23	3 17		-		14	* 15	4				_		+	Ш	3	11	13	20		1					Ш	1	1												1		22
VAR	10		1 12	_						2										1			1			Ш	_						\perp			11	12	3					6		8#										7 46			17			
SPARE	11		12 1	*	Ш	1	13				Ш			_		_				_ 2	4 14		1	3	8		_	L	Ш		4		_	Ш					9									Ш										19			
OPTIONS	12		12				5 8										*				6	22			10				3	*						11	15 13																	2**			* 7				24
JUMPERS					6					1,3						1			2		,		-		2										6								3	4,5	* 5																
J1 POWER SUPPLY			* *						-														1		* 3																						* *									П					
J2 RECEIVER			3 24		11,	*-												8 5					15		25									,	*											30 3	4					12	* *	1	1				17	18	П
J3 TEST SET METER							* 5									7																										П						П				1	2								
J4 METERING			5 21		П		16							3		14 15												-							9	П												22			19	10 1	12						11 7	. :7	
JS XMTR			0 28		П						14					# 17		30							13 11	18																	12 24	5 27			26	Π,	-# 1, 2 7, 8 3	2, 41	5 **				25		29				П
J6																																									Ť						21	Ħ	, • 3	-	10				25	Ť	24				
				T						6*		, *		,*		+		T																							T						21					1									
TB1 REMOTE CONTROL L	.1462				П		H						11	,				T		T			T	П			1	T				\Box									T								3 1	* *									+		
TB2 HIGH CURRENT				+				+-				+				+		t					-					* 13		*	+	-#- 19					1			+	+	*					+		3 1	2		+					+	+			
TB3 EXTERNAL			10 5 J100 1 -1,-7	+	H	+	8	+	+	+	J100			+		6 20		J100		.11	00	14	+	H	+	J100	- 11	13	H	7	15 17	19	9	16	+	H	+	+		3	2		J100			+	+	,100	+	+		+		5	H		-100 -13	10-	.100		
EXTERNAL CONNECTION	POINTS	F	1 -1,-7								-2				1			-10		-6						1-3					è									1		1	-12					-8		1					i		-13		-8		

EEPS-34073-A

parts list

REFERENCE	MOTOROLA PART NO.	DESCRIPTION
CR1, 2	48-83654H01	diode: (see note) silicon
E1.2,3,4	80-83029H01	spark, gap: 250 V ± 15%
13	9-84207801	connector, receptacle. female, 7-contact
	me	echanical parts
	3-84482M01 29-83362G01	SCREW, machine, insulator, 29 used TERMINAL, 29 used
	29-8402RH09	TERMINAL, plug: 348 used
	39-10184A10	CONTACT, plug, 11 used
	28-84269C01	TERMINAL, contact, low profile, 13 used
	28-84269C02	TERMINAL, contact; high profile, 10 used



- 1 These connections are made on non-synthesized stations only
- 2 CR1 and CR2 used with B84, C35, and C75 station models on

	Jumper Chart		
Jumper	Normal	Description	
JU1	OUT	IN To Remove Xmit Notch	
JU2	OUT	IN For Guard Tone only or Modern Key-Up	
JU3	IN	OUT For Non-Preemphasized Xmit Audio	
JU4	OUT	IN For Non-Flat Audio	
JU5	OUT	IN When Not Using VAR Module	
JU6	out	IN To Remove Royr Notch	
307	OUT	IN For Non-Binary Paging Applications and	
		Non-PL Link Applications	

TRN4860A Unified Remote Control Board Circuit Board Detail & Parts List Motorola No. PEPS-34630-A 10/5/82 - V & G

Q4 M9642

DEPS-34495-0

parts list

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	
		capacitor, fixed: uF ± 20%; 20 V;	
		unless otherwise stated	
C1	23-84538G02	4.7	
C2, 3	21-11015B13	.001 ±10%; 100 V	
C4	8-84637L48	.068 ± 5%; 100 V	
C5	8-83813H14	$.043 \pm 5\%; 50 \text{ V}$	
C6 ·	23-84538G02	4.7	
C7	23-11013C07	10 ± 10%; 15 V	
C8	23-84538G02	4.7	
C9	8-84326A25	.0326 ± 2%; 50 V	
C10	8-84326A18	.0098 ± 2%; 50 V	
C11	8-84326A13	.0056 ± 2%; 50 V	
C12	8-84326A30	.0045 ± 1%; 50 V	
C13	23-84538G02	4.7	
C14	23-11013C07	10 ± 10%; 15 V	
C15, 16	23-84538G02	4.7	
C17	21-11015B13	.001 ± 10%; 100 V	
C18, 19	23-84538G02	4.7	
		transistor: (see note)	
Q1, 2, 3, 4	48-869642	NPN; type M9642	
		resistor, fixed: ±5%; 1/4 W;	
		unless otherwise stated	
R1	6-11009E91	56k	
R2	6-11009E81	22k	
R3	6-11009E55	1.8k	
R4, 5	6-11009E63	3.9k	
R6	6-11009E99	120k	
R7	6-11009E93	68k	
R8	6-11009E69	6.8k	
R9	6-11009E49	1k	
R10	6-11009E65	4.7k	
R11	6-11009E67	5.6k	
R12	6-11009E49	1k	
R13	6-11009E69	6.8k	
R14	6-11009E63	3.9k	
R15	6-11009E99	120k	
R16	6-11009E93	68k	
R17	6-11009E69	6.8k	
R18	6-11009E41	470	
R19	6-11009E49	1k	
R20	6-11009E65	4.7k	
R21	6-11009E81	22k	
R22	6-11009E73	10k	
R23	6-11009E65	4.7k	
R24	6-11009C51	1.2k	
R25, 26	6-11009E97	100k	
R27	6-11009D04	180k	
R28	18-83311K11	variable; 25k	
	6-11009C65	4.7k	
R30	6-11009E01	10	
14	F	integrated circuit: (see note)	
	51-82884L14	quad analog switch; IC CMOS	
J2	1-80755D60	IDC hybrid	
	me	echanical part	

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.

DIGITAL MODULATOR MODULE

MODEL TRN4856B

O-DEVIATION DIGITAL MODULATOR +DEVIATION FRONT PANEL DETAIL

FUNCTION

This module accepts binary data from the Transmitter Site Interface (TSI) module and dc level shifts it to the proper voltages to deviate the transmitter carrier frequency ± 4 kHz corresponding to binary "1"s and "0"s.

The splatter filter attenuates high frequency energy from the binary data stream prior to application to the modulator. This limits the bandwidth of the transmitted signal per FCC regulations.

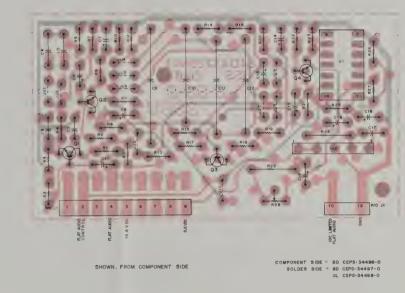
This module also provides gating of the binary data to the modulator stage in the transmitter, via the "Data Indicate" signal originating in the TSI module. The delayed keyed A+ from this module prevents the transmitter from un-keying during transitions between the normal mode and the binary mode of operation.

NOTES:

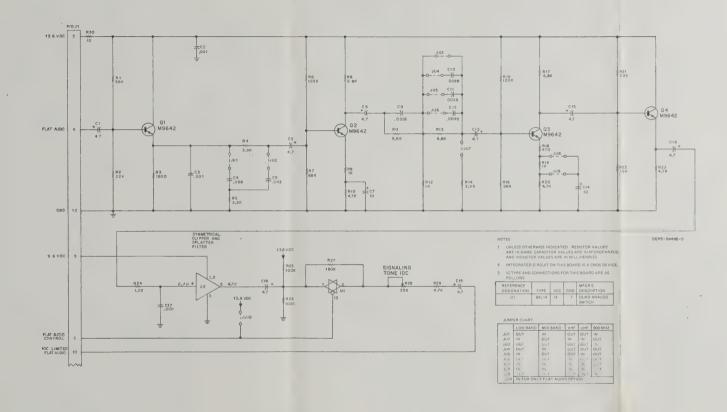
- Unless otherwise indicated: resistor values are in ohms; capacitor values are in microfarads.
- 2. Integrated circuits on this board are CMOS devices.
- 3. IC types and connections for this board are as follows:

Reference Designation	Туре	vcc	Gnd	Mfgr's Description	
U1	29M08	4	11	Quad Op Amp	
U2	84L14	14	7	Quad Analog Gate	

TRN4856B Digital Modulator Module Circuit Board Detail, Schematic Diagram & Parts List Motorola No. PEPS-34632-A 10/5/82 - V & G



TRN5348A Transmitter Flat Audio Board Circuit Board Detail, Schematic Diagram & Parts List Motorola No. PEPS-34631-0 5/12/82 - V & G



parts list

REFERENCE	MOTOROLA PART NO	DESCRIPTION	
		and the same of th	_
		capacitor, fixed uF ± 20%, 20 V	
		unless otherwise stated	
C1	23-84538G02	4.7	
C2. 3	21-11015B13	.001 ± 10%, 100 V	
C4	8-84637L48	068 ± 5% 100 V	
C5	8-83813H14	043 + 5° + 50 V	
C6	23-84538G02	47	
C7	23-11013C07	10 ± 10%, 15	
C8	23-84538G02	4.7	
C9	8-84326A25	0326 = 2	
C10	8-84326A18	0000 - 1	
C11	8-84326A13		
C12	8-84326A30	0045	
C13	23-84538G02	4.7	
C14	23-11013C07	10 ± 10%, 15 V	
C15, 16	23-84538G02	47	
C17	21-11015813	.001 ± 10%, 10	
C18, 19	23-84538G02	1 °	
C10, 19	23-84538G02		
		transistor (see note)	
01.2.3.4	48-869642	NPN type M9642	
	40 000046	147 14 Lype moves	
		resistor, fixed. ± 5%, 1/4 W	
		unless otherwise stated	
R1	6-11009E91	56k	
R2	6-11009E81		
R3	6-11009E55	18	
R4.5	6-11009E63	39	
R6	6-11009E99	120)	
87	6-11009E93		
B8		68k	
	6-11009E69	6.Bk	
R9	6-11009E49	11	
R10	6 11009E65	4.7)	
B11	6 11009E67	5.6)	
B12	6-11009E49	11k	
R13	6-11009E69	6 8k	
R14	6-11009E63	3 9k	
R15	6-11009E99	120k	
R16	6-11009E93	68>	
R17	6-11009E69	6.8	
A18	6-11009E41	470	
R19	6-11009E49	1k	
R20	6-11009E65	4.7)	
R21	6-11009E81	22)	
R22	6-11009E73	10k	
R23	6-11009E65	4.79	
R24	6-11009C51	1.21	
R25, 26	6-11009E97	100)	
R27	6-11009D04	180k	
R28	18-83311K11	variable 254	
R29	6-11009C65	variable 254	
R30	6-11009C65 6-11009E01		
1130	0-11009201		
		Integrated circuit (see note)	
U1	51-82884L14	quad analog switch IC CMOS	
1/2	1-80755D60	IDC hybrid	
	m	echanical part	

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.

FUNCTION

the modulator stage in the transmitter, via the "Data Indicate" signal originating in the TSI module. The delayed keyed A+ from this module prevents the transmitter from un-keying during transitions between

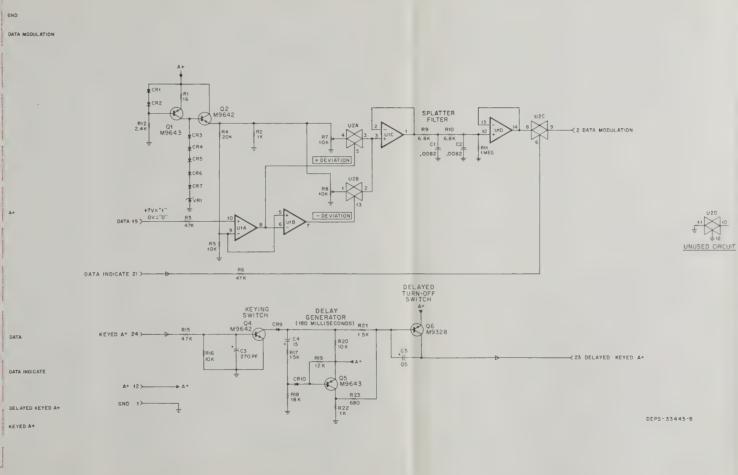
FRONT PANEL DETAIL

- 1. Unless otherwise indicated resistor values are in ohms, capacitor values are in
 - 2 Integrated circuits on this board are CMOS devices
- 3. IC types and connections for this board are as follows

Reference Designation	Type	vcc	Gnd	Mfgr's Desi
U1	29M08	- 4		Quad Op Arr

TRN4856B Digital Modulator Module Circuit Board Detail, Schematic Diagram & Parts List Motorola No. PEPS-34632-.4 10/5/82 - V & G

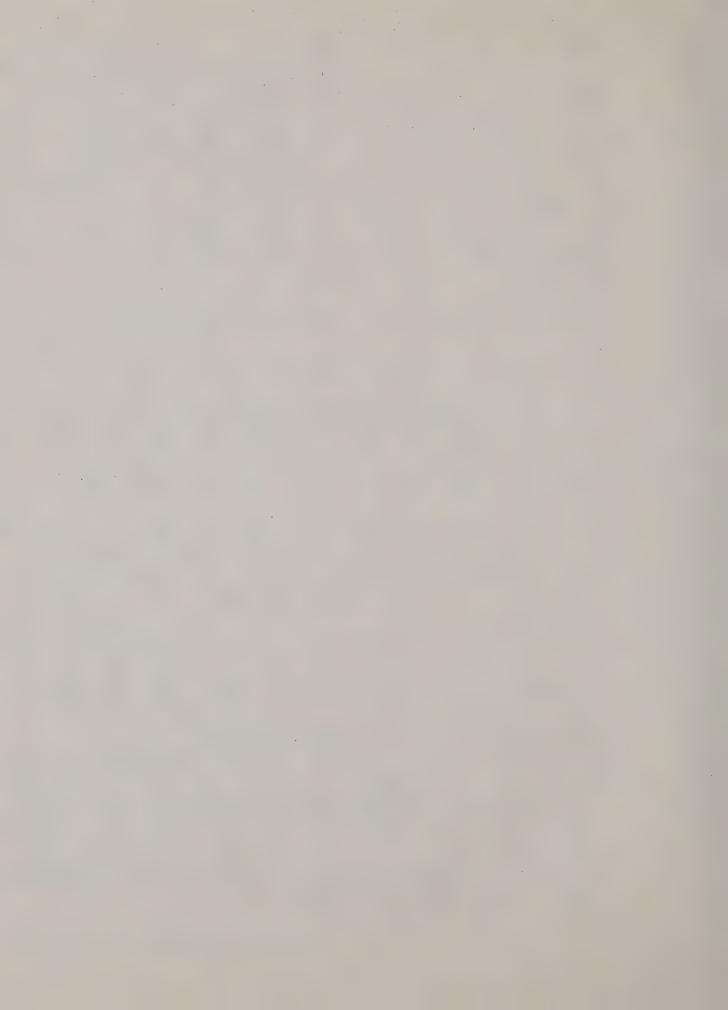
84L14 14 7 Quad Analog Gate



COMPONENT SIDE BD-DEPS-35226-0 SOLDER SIDE BD-DEPS-35227-0

OL-DEPS-35228-0

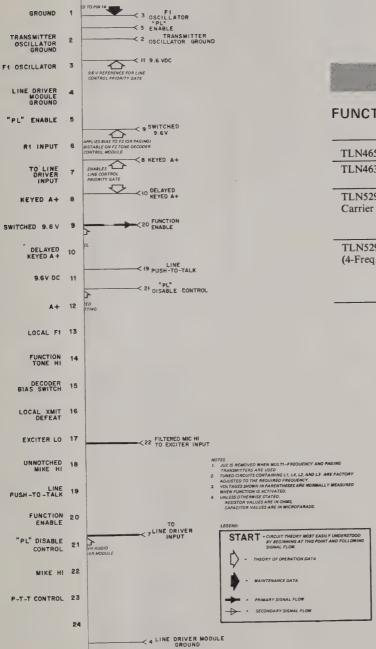
SHOWN FROM COMPONENT SIDE



F1 "PL" TONE DECODER MODULES త

F1 & F1-PL TONE DECODER **MODULES**

MODELS TLN4638A F1-PL TLN4658A F1 TLN5293A F1 (4F) TLN5294A F1-PL (4F)



FUNCTION

TLN4658A F1 Control	Keys XMTR on F1.
TLN4638A F1-PL Control	Keys XMTR on F1 and PL disables RCVR.
TLN5293A F1 Control (4-Freq. Carrier Squelch Station)	Provides receive and transmit notch filters. Frequency selected on separate 4-Freq. control module (TLN5292A).
TLN5294A F1-PL Control (4-Freq. PL Squelch Station)	Provides receive and transmit notch filters and PL disables RCVR. Frequency selected on separate 4-Freq. control module (TLN5292A)

PARTS LIST SHOWN ON BACK OF THIS PAGE 68P81016E19-N 10/5/82 - V & G

parts list

TRN4856B Digital Modulator Module PL-7983-A REFERENCE MOTOROLA SYMBOL PART NO. DESCRIPTION capacitor, fixed: uF; unless otherwise stated 8-83813H30 .0062 ± 109%; 100 V 21-82187B22 270 pF ± 109%; 200 V 23-82783B24 15 ± 159%; 25 V 21-82372C04 .05 + 80-20%; 25 V C1, 2 C3 C4 C5 diode: (see note) CR1 thru 10 48-83654H01 allicon transistor: (see note) PNP; type M9643 NPN; type M9642 48-869643 48-869642 48-869642 48-869643 48-869328 NPN; type M9642 PNP; type M9643 NPN; type M9328 resistor, fixed: ±5%; 1/4 W; unless otherwise stated 18 6-11090C49 10
6-11090C49 47k
6-11090C49 47k
6-11090C49 47k
8-6-11090C49 47k
8-6-11090C49 47k
8-6-11090C49 47k
8-6-11090C49 47k
8-6-11090C49 17k
6-11090C49 1 6-11009C06 R3,6 R4 R5 R7,8 R9,10 R11 R12 R15 R16 R17 R18 R19 R20 R21 R22 R23 51-83629M08 Integrated circuit: (see note)
51-82884L14 quad analog gate voltage regulator: 48-82256C44 Zener type; 7.5 V mechanical parts 3-125790 SCREW, machine; 4-40 x 5/16"; 2 ut 48-93914(301 GARD, guide; 2 used 48-84703E01 GUIDE, circuit board 84-831831,13 PANEL, screened 9-3387/M01 RECEPTACLE, lemale; 24 used 43-865060 BUSHING; 2 used SCREW, machine; 4-40 x 5/16"; 2 used

note: For optimum performance, diodes, translators, and integrated circuits must be ordered by Motorola part numbers.

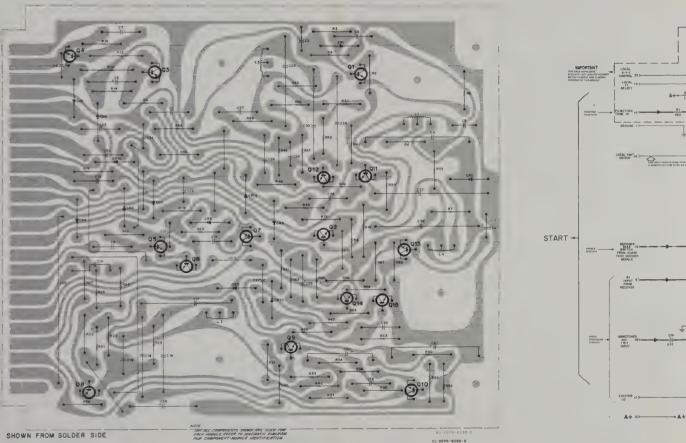
F1 & F1-PL TONE DECODER

Carrier Squelch Station) notch filters. Frequency selected

(4-Freq. PL Squelch Station) notch filters and PL disables RCVR Frequency selected on separate 4-Freq. control module



PARTS LIST SHOWN ON BACK OF THIS PAGE 68P81016E19-N 10/5/82 - V & G



enouse 1 TRANSMITTER OSCILLATOR GROUND F: OSCILLATOR 3 LINE DRIVER 4 "PL" EHABLE S

RI INPUT 6

TO LINE DRIVER

REYED A+ 8

\$WITCHED 9 6 V 9 DELAYED 10

9 6 V DC 11

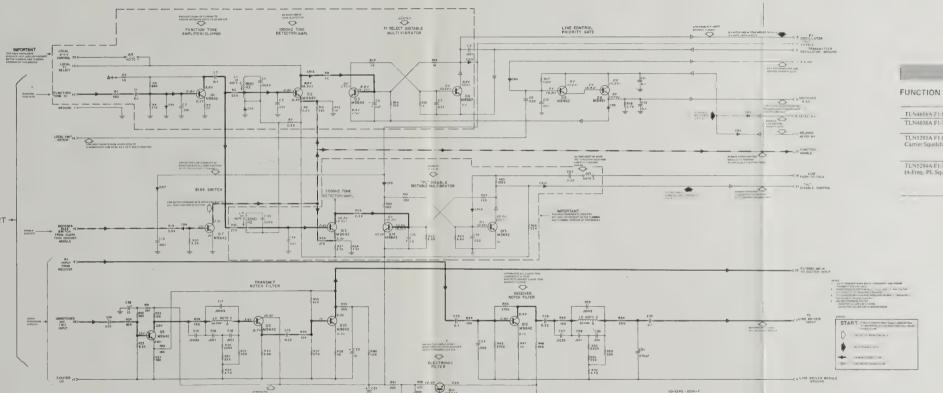
FUNCTION 14 DECODER 18 LOCAL XWIT 16 DEFEAT EXCITER LO 17 UMMOTCHED 18

PUSM-TO-TALK 19 FUNCTION 20

#IKE HI 22

P-Y-T CONTROL 28

A+ 12 LOCAL FE 13







parts list

TLN4658A F1 Control Madule TLN4638A F1 Private-Line Control Module TLN5293A F1 Control Module

D1 4700

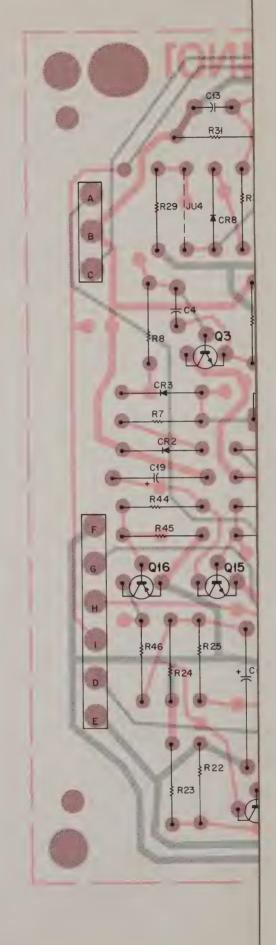
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRÍPTION
		capacitor, fixed: uF ± 10%; 50 V unless otherwise stated:
C1	8-82905G07	0.1
C2	21-82187B29	.001; 100 V
C1 C2 C3 C4	8-82905G07 8-84326A14	0.
C5	21-82187B29	.006 ± 2% .001; 100 V 1 ± 20%; 35 V
C8	23-82783B08	1 ± 20%; 35 V
C7	8-82905G02	.022
C8 C9	21-82187929 8-82905G11	.001; 100 V 0.22
C10	21-82187B29	.001; 100 V
C11, 12	8-82905G07	0.1
C13, 14	21-82187B29	.001; 100 V
C15 C16	8-82905G25 8-82284C01	.0033
C17	8-84326A30	.0045 ± 1%
C18	8-82284C01	.001
C19 C20	8-82905G11 23-865136	0.22 15 ± 20%; 25 V
C21	23-84669A19	100 + 150-10%; 20 V
C22	23-82601A25	100 + 150-10%; 20 V
C23 *	8-82905G07	0.1
C24	21-82187B27 8-82905G03	.002; 100 V .047
C25 C26	8-82905G11	0.22
C27	8-82905G25	.0033
C27 C28 C29	8-82284C01	.001 .0045 ± 1%
C29	8-84326A30 8-82284C01	.0045 ± 1%
C30 C31 C32	21-82187B22	270 pF; 200 V
C32 C33	8-82905G07	0.1
C33 C34	8-84326A13 21-82187B29	.0056 ± 2% .001; 100 V
C35	23-82783B08	1 ± 20%; 35 V
C36	8-82905G02	.022
C37	8-82905G11	0.22
C38	23-865136	15 ± 20%; 25 V
CR1 thru 13	48-83654H01	semiconductor device, diode (see note)
OTT LING TO	40 0000 11101	reactor:
L1 thru 4	1V80702B11	(factory-adjusted) res. 40 ohms ± 10%; includes grounding clip
		transistor: (see note)
Q1,2	48-869642	NPN; type M9642 PNP; type M9643
Q3 Q4	48-869643 48-869587	PNP; type M9643 NPN; type M9567
Q5	48-869642	NPN; type M9642
Ω6	48-869491	NPN; type M9491
Q7, 8, 9, 10, 11,	48.869842	11011 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
12, 13 Q14	48-869642 48-869643	NPN; type M9642 PNP; type M9643
Q15	48-869642	PNP; type M9643 NPN; type M9642
		resistor, fixed; ± 5%; 1/4 W;
		unless otherwise stated
R1	6-11009C43	560
R2 R3	6-11009C49 6-11009C93	1k 68k
R3 R4	6-11009C93 6-11009C83	68k 27k
R5.6	6-11009C81	22k
R7,8	6-11009C57	2.2k
R9 R10	6-11009C49 6-11009C33	1k 220
B11		NOT USED
R12	8-11009C49	1k
R13	8-124A49	1k; 1/2 W
R14 R15	6-11009C73 6-11009C49	10k 1k
R16	R-124 849	1k: 1/2 W
R17	8-11009C97	100k
R18	8-11009C97 6-11009C59 6-11009C63	2.7k 3.9k
R19 R20	6-11009G63 6-11009C57	3.9K 2.2k
R21	6-11009C57 6-11009C79	18k
R22	6-11009C91	56k
R23 R24	8-11009C73	10k 82k
H24 R25	6-11009C95 6-11009C71	8.2k
R26	6-11009C79	18k
R27	6-11009C43	560
R28 R29	8-11009C41 8-11009C77	470 15k
H29 R30	6-11009C77 6-11009D06	220k
	6-11009C85	33k
R31		
R31 R32	6-11009C65	4.7k
R31 R32 R33	6-11009C65 6-11009C85 6-11009C87	33k
R31 R32	6-11009C65	4.7k 33k 5.6k 10k 82k

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R37	6-11009C83	27k
R38	6-11009C19	56
R39	6-11009C43	560
R40	8-11009C51	1.2k
R41	6-124A25	100; 1/2 W
R42	6-11009C53	1.5k
R43	6-11009C59	2.7k
R44	6-11009C73	10k
R45	6-11009D08	270k
R48	6-124808	270k ± 5%
R47	6-11009C49	1k
R48	6-11009C73	10k
R49	6-11009C77	15k
R50	6-11009D08	220k
R51	6-11009C85	33k
R52	6-11009C65	4.7k
R53	6-11009C85	33k
R54	6-11009C87	39k
R55	6-11009C83	27k
R56	6-11009C35	270
R57	6-11009C59	2.7k
R58	6-11009C53	1.5k
R59	6-11009C57	2.2k
R60, 61	6-11009C73	10k
R62, 63	6-11009C69	6.8k
R64	6-11009C81	22k
R85	6-11009C97	100k
Dec	6 110000081	206

note: Replacement diodes and translators must be ordered by Motorola part number only for optimum performance.







TRN4853A Transmitter Site Interface Module Circuit Board Detail, Schematic Diagram & Parts List Motorola No. PEPS-34633-A (Sheet 1 of 2) 10/5/82 - V & G

TRANSMITTER SITE INTERFACE MODULE

TRANSMITTER SITE INTERFACE MODULE (TSI)

MODEL TRN4853A

istor values are in ohms and capacitor values

in the following chart.

rmal Usage

tect key-up) Jata) Jata) on) ve voltage module is used)

n is removed)

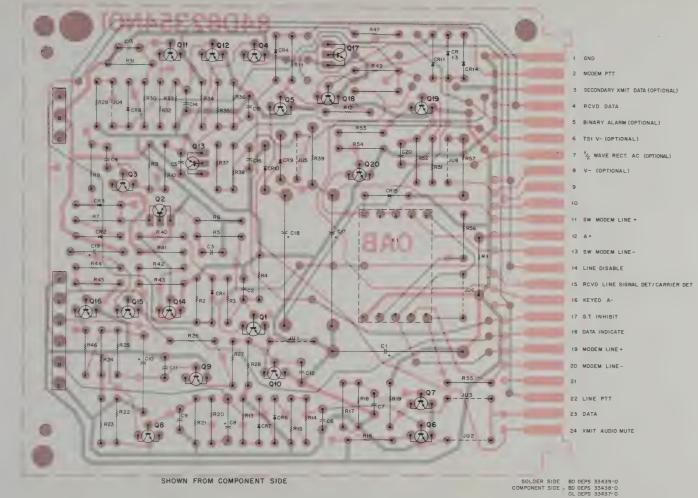
ve voltage module is used)

FUNCTION

This module accepts binary data from the modem and dc level shifts it to the proper logic levels required by the digital modulator module for binary paging. The T.S.I. module provides a modem PTT function in conjunction with the carrier detect signal and the binary output data from the modem. The modem PTT function is used to key the station in the binary mode of operation. The modem PTT signal is also used to inhibit the guard tone decoder allowing the station to go into the FSK-NRZ (frequency shift keying - non return to zero) mode required for binary signaling.

A relay and associated driver control circuitry are contained in this module to switch the modem off line until the station has received the proper tone remote signaling commands. This prevents modem falsing and subsequent transmitter key up falsing due to telephone line or radio link noise. It also prevents the modem from being on the line during line PTT.

TRN4853A Transmitter Site Interface Module Circuit Board Detail, Schematic Diagram & Parts List Motorola No. PEPS-34633-A (Sheet 2 of 2) 10/5/82 - V & G



TRN4853A Transmitter Site Interface
Module Circuit Board Detail, Schematic Diagram
& Parts List
Motorola No. PEPS-34633-A
(Sheet I of 2)
1015/82 - V & G

parts list

TRN4853A Transmitter Site Interface Module PL-7

SYMBOL	E MOTOROLA PART NO.	DESCRIPTION
		capacitor, fixed: uF ± 10%; 100 V;
		unless otherwise stated 100 + 150-10%; 20 V .001
C1 C2 thru 5	23-82601A25 21-11015D13	100 + 150-10%; 20 V
C2 thru 5 C8, 7		.001
C8	8-82905G22	.02
C8	21-11015B13 8-82905G23 21-11015B13 23-82783B37 21-11015B13 23-82077C01 23-84762H06 21-11015B13 48-83654H01 48-83654H01	.001
C10	23-82783B37	47 ± 20%; 25 V .001
C11 thru 16	21-11015B13	.001
C17, 18	23-82077C01	100 + 150-10%; 35 V
C19 C20	23-84762H06	1.0 ± 20%; 35 V .001
C20	21-11015813	.001
		diode: (see note)
CR1 thru 4	48-83654H01 48-83654H01	silicon
CR5 thru 8	48-83854H01	
CR1 thru 4 CR5 thru 8 CR9, 10 CR11	48-82488H13	silicon
CR13 14 15	48-83654H01 48-83654H01	silicon silicon
2	-5000001101	
		connector, receptacle:
J1, 2, 3	9-83073L02	Jack, phone
K1	80-82617IM06	relay, reed: 13.4 V; coil res. 240 ohms ± 10%
KI	00-02017 M00	13.4 Y; CUII 165. 240 DRIMS ± 10%
Q1	48-859642	NPN; type M9642
Q2	48-869732	transistor: (see note) NPN; type M9642 PNP; type M9732
Q3, 4 Q5	48869642	NPN; type M9642 PNP; type M9643
Q5 Q6, 7, 8	46-889643	MON type M9643
Q9	48869642 48-869643 48-869642 48-869643 48-869567 48-869642 48-869732 48-869732	NPN; type M9642 PNP; type M9643
Q10	48-869567	
Q11	48-869642	NPN; type M9642 PNP; type M9643 PNP; type M9632
Q12	48-869643 48-869732 48-869642 48-869643	PNP; type M9643
Q13	48-889732	PNP; type M9632
Q14, 15 Q16	46-869642 -	NPN; type M9642 PNP; type M9643
Q17		NPN: type M9640
Q18	48-889642	NPN: type M9642
Q19	48-869643	PNP: type M9643
Q20	48-889642	NPN; type M9642
		resistor, fixed: ±5%; 1/4 W; unless otherwise stated
R1	6-125C01	10 ± 10%, 1/2 W
R2	B-11009C87	5.6k
R3	6-11009C71	8.2k
R4	6-11009C89	47k
R5, 6 R7	6-11009C73	10k
R7 R8	6-11009C51 6-11009C77	1.2k 15k
no R9	6-11009C77	15K 22k
R10, 11	6-11009C85 6-11009C65 6-11009C73	4.7k
R12	6-11009C73	10k
R13	6-11009C65	4.7k
R14 R15	6-11009C63	3.9k 47k
H15 R16	6-11009C69	47K 620
R17	6-11009C/3 6-11009C83 6-11009C89 6-11009C89 6-11009C81 6-11009C81 6-11009C71 6-11009C73 6-11009C73 6-11009C73 6-11009C73 6-11009C73 6-11009C73 6-11009C73 6-11009C89 6-11009C89 6-11009C89	22k
R18	6-11009C89	47k
R19	6-11009C44	620
R20	6-11009C71	8.2k
R21	5-11009C89	47k
R22 R23	6-11009C37 6-11009C61	330 3,3k
n23 R24	6-11009C97	3.3K 100k
R25	6-11009C89	47k
R26	6-11009C49 6-11009C73 6-11009C89 6-11009C85	14
R27	6-11009C73	10k
R28	6-11009C89	47k
		4.7k 47k
R29	6.11009000	
R29 R30, 31	6-11009C89 6-11009C77	15k
R29 R30, 31 R32	6-11009C89 6-11009C77 6-11009C89	15k
R29 R30, 31 R32 R33 R34	6-11009C89 6-11009C77 6-11009C89 6-11009C57	15k 47k 2.2k
R29 R30, 31 R32 R33 R34 R35	6-11009C89 6-11009C89 6-11009C57 6-11009C61	15k 47k 2.2k 3.3k
R29 R30, 31 R32 R33 R34 R36 R36	6-11009C89 6-11009C89 6-11009C57 6-11009C61 6-11009C89	15k 47k 2.2k 3.3k 47k
R29 R30, 31 R32 R33 R34 R36 R36 R37	6-11009C89 6-11009C89 6-11009C89 6-11009C61 6-11009C89 6-11009C43	15k 47k 2.2k 3.3k 47k 560
R29 R30, 31 R32 R33 R34 R35 R36 R37	6-11009C89 6-11009C77 6-11009C89 6-11009C61 6-11009C89 6-11009C43 6-11009C09	15k 47k 2.2k 3.3k 47k 580 22
R29 R30, 31 R32 R33 R34 R35 R36 R37 R37	6-11009C89 6-11009C77 6-11009C89 6-11009C81 6-11009C89 6-11009C89 6-11009C09 6-125&23	15k 47k 2.2k 3.3k 47k 580 22 10k; 1/2 W
R29 R30, 31 R32 R33 R34 R35 R36 R37 R38 R38 R38	6-11009C89 6-11009C77 6-11009C89 6-11009C81 6-11009C89 6-11009C89 6-11009C09 6-125&23	15k 47k 2.2k 3.3k 47k 560 22; 10k; 1/2 W 22k
R29 R30, 31 R33 R34 R35 R36 R37 R38 R39 R40 R41 Ihru 43	6-11009C89 6-11009C77 6-11009C57 6-11009C57 6-11009C89 6-11009C89 6-11009C43 6-11009C81 6-11009C81 6-11009C81	15k 47k 2.2k 3.3k 47k 560 22 10k; 1/2 W 22k 10k
R29 R30, 31 R32 R33 R34 R35 R36 R37 R38 R40 R41 lhru 43 R41	6-11009C89 6-11009C77 6-11009C57 6-11009C57 6-11009C89 6-11009C89 6-11009C43 6-11009C81 6-11009C81 6-11009C81	15k 47k 2.2k 3.3k 47k 560 22 10k; 1/2 W 22k 10k 16 560
R29 R30, 31 R32 R33 R34 R35 R36 R37 R38 R39 R40 R41 Ihru 43 R44 R45 R45 R46	6-11009C89 6-11009C77 6-11009C57 6-11009C57 6-11009C89 6-11009C89 6-11009C43 6-11009C81 6-11009C81 6-11009C81	15k 47k 2.2k 3.3k 47k 560 560 52 22 10k; 1/2 W 10k 16 560 33
R29 R30, 31 R32 R33 R34 R35 R36 R37 R38 R40 R40 R41 Ihru 43 R44 R45 R45	6-11009C89 6-11009C77 6-11009C89 6-11009C81 6-11009C89 6-11009C89 6-11009C09 6-125&23	15k 47k 2.2k 3.5k 550 22 10k:112 W 22k 10k 10k 1k 10k 1k 10k 10k 10k 10k 10k
R29 R30, 31 R32 R33 R34 R35 R36 R37 R38 R40 R41 Ihru 43 R44 R45 R45 R45 R45 R46 R47 R47	6-1109C89 6-1109C97 6-1109C57 6-1109C57 6-1109C61 6-1109C43 6-1109C43 6-1109C43 6-1109C73 6-1109C73 6-1109C43 6-1109C73 6-1109C73 6-1109C73 6-1109C73	15k 27k 27k 47k 500 17c
R29 R29, 31 R32, R33 R33 R34 R35 R36 R37 R38 R40 R41 R41 R45 R45 R47 R46 R47 R48 R48	6-1109C89 6-1109C97 6-1109C57 6-1109C57 6-1109C61 6-1109C43 6-1109C43 6-1109C43 6-1109C73 6-1109C73 6-1109C43 6-1109C73 6-1109C73 6-1109C73 6-1109C73	15k 47k 2.2k 3.5k 550 22 10k:112 W 22k 10k 10k 1k 10k 1k 10k 10k 10k 10k 10k
R29 R30, 31 R32 R33 R33 R34 R35 R37 R36 R37 R38 R40 R41 R45 R45 R47 R48 R47 R48	6-11099C99 6-11099C97 6-11099C99 6-11099C97 6-11099C91 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99	15k 47k 2.2k 438 446 450 22 10k, 1/2 W 22 10k, 1/2 W 28 10k
R29 R30, 31 R32 R33 R33 R34 R35 R37 R36 R37 R37 R38 R40 R41 Ihru 43 R44 R45 R46 R46 R47 R48	6-11099C99 6-11099C97 6-11099C99 6-11099C97 6-11099C91 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99	156 Tr. 2.7 Tr
R29 R30, 31 R32 R33 R34 R35 R36 R36 R37 R37 R38 R39 R40 R41 R45 R45 R47 R46 R47 R46 R47 R46 R47 R46	6-11099C99 6-11099C97 6-11099C99 6-11099C97 6-11099C91 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99 6-11099C99	15% 27h 27h 27h 47h 560 27c 17c 17c 17c 17c 17c 17c 17c 17c 17c 1
R29 R30, 31 R32 R33 R34 R35 R37 R36 R37 R37 R38 R39 R40 R41 Ihru 43 R44 R45 R46 R46 R46 R46 R46	6-110/9C89 6-110/9C97 6-110/9C97 6-110/9C95 6-110/9C96 6-110/9C96 6-110/9C96 6-110/9C96 6-110/9C96 6-110/9C96 6-110/9C96 6-110/9C96 6-110/9C96 6-110/9C96 6-110/9C96 6-110/9C96 6-110/9C96	156 Tr. 2.7 Tr

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		switch, slide:
S1	40-83204B03	3 pd1
\$2	40-83204B01	dpdt
	3-125790	SCREW, machine: 4-40 x 5/16"; 2 used
	45-83914G01	GUIDE, card; 2 used
	46-84703E01	GUIDE, circuit board
	1-80761D46	PANEL, riveted (includes ref. Item S1, S2)
	9-83697M01	RECEPTACLE, board mounting; 24 used
	43-865080	BUSHING, threaded; 2 used

TRANSMITTER SITE INTERFACE MODULE (TSI)

This module accepts binary data from the modem and

dc level shifts it to the proper logic levels required by the

digital modulator module for binary paging. The T.S.I.

module provides a modem PTT function in conjunction

with the carrier detect signal and the binary output data

from the modem. The modem PTT function is used to key the station in the binary mode of operation. The

modem PTT signal is also used to inhibit the guard tone decoder allowing the station to go into the FSK-NR7

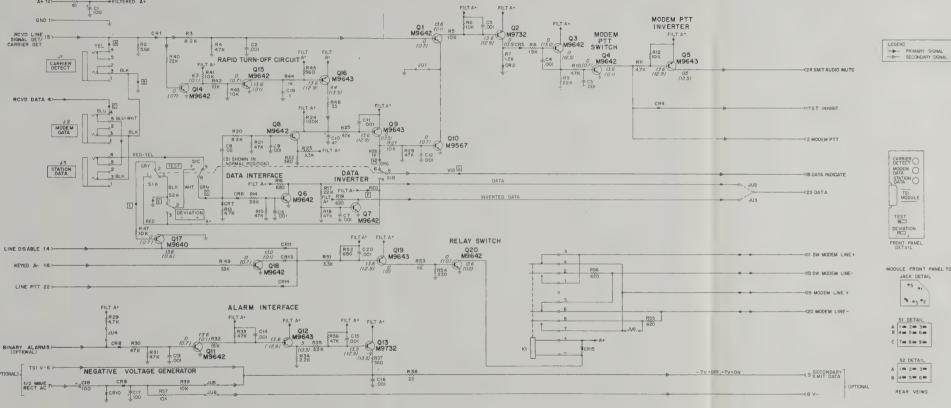
(frequency shift keying - non return to zero) mode re-

A relay and associated driver control circuitry are contained in this module to switch the modem off line until quent transmitter key up falsing due to telephone line or radio link noise. It also prevents the modem from being

FUNCTION

quired for binary signaling

MODEL TRN4853A



NOTES

If Unless specified otherwise reastor values are in ohms and capacitor values are in microfarads

2 Jumper configurations are given in the following chart

JUI	mper	reemal Usage
J	IU1	Out (In for signal detect key-up)
J	IU2	In (Out for inverted data)
J	IU3	Out (In for inverted pata)
J	IU4	In (Out for ventication)
J	IU5	In (Out when negative voltage module is used)
J	U6	Out (In when modern is removed)
J	IU7	NOTUSED
	1118	in /Out when negative voltage module is used)

MODULE FRONT PANEL TOP JACK DETAIL

% •3 •2

S1 DETAIL A 1 = 2 = 3 = B 4 = 5 = 6 = C 7-8-9-

S2 DETAIL A 1= 2= 3= B 4= 5= 6=

REAR VEIWS

EEPS - 33250 - A

TRN4853A Transmitter Site Interface Module Circuit Board Detail, Schematic Diagram & Parts List Motorola No. PEPS-34633-A (Sheet 2 of 2) 10/5/82 - V & G

DESCRIPTION

150k 10k 1.7k

witch, slide: ipdt

ransformer, line driver:
ins #7 and 9 dc resist. = 110 ohms
ins #1 and 2 dc resist. = 25 ohms
ins #3 and 4 dc resist. = 25 ohms
ins #11 and 12 dc resist. = 250 ohms
ins #17 and 9 dc resist. = 250 ohms
ins #1 ad 2 dc resist. = 250 ohms
ins #1 ad 2 dc resist. = 25 ohms
ins #3 and 4 dc resist. = 25 ohms
ins #1 and 12 dc resist. = 25 ohms

erenced items

erenced items

DIRCUIT BOARD

notludes:

RECEPTACLE, board mounting; 24 used
BUSHING, threaded; 2 used
PANEL, riveted

notludes: ref. items S1
PANEL
WASHER, insulated
SCREW, tapping; 4-40 x 5/16"; 2 used
SCREW, tapping; 4-40 x 5/16"; 2 used
SRACKET, panel
STRAP, tie; 3 used
CARD, guide; 2 used
SUIDE, circuit board

des, transistors, and integrated circuits mu

des, transistors, and integrated circuits must

LINE DRIVER MODULE

MODEL TRN4859A

esistor	values	are i	in	ohms	and	capacitor	values

) indicate signal input levels for ac voltage (V ises, the signal generator is set to the level in-

en in the following chart:

ol; out for 4-wire control

or special applications.
or special applications.
or special applications.
or RCVR line levels <- 10 dBm.

sed in binary stations.

guard tone filters when injecting a 1 V rms signal



FUNCTION

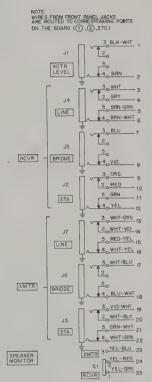
This module amplifies and gates incoming 600-ohm line audio to the transmitter. It also routes incoming modem tones for binary paging applications to the modem via a relay in the transmitter site interface module (TSI). The line driver also receives audio from an optional monitor or link receiver, gates and amplifies it so it is capable of driving a 600-ohm telephone line.

When the station has local speaker monitoring capability, a front panel mounted switch on the line driver selects either received or transmit audio which is routed to the local speaker. An amplifier circuit is located in both receive and transmit audio paths to drive the local speaker final amplifier circuits.

The test jacks located on the front panel facilitate level settings. Three jacks are for receiver line audio measurements and an additional set of three jacks are for transmit line audio measurements. One bridging and two terminating jacks are provided in each set of three jacks mentioned above. An additional test jack labeled XCTR LEVEL is provided for injecting a test tone directly into the exciter audio circuitry for Instantaneous Deviation Control (IDC) setting.

Jumpers in the module provide for either a 4-wire configuration (receive audio on a separate phone line from transmit audio) or a 2-wire configuration (receive and transmit audio combined on the same telephone line).

TRN4859A Line Driver Module Circuit Board Detail, Schematic Diagram & Parts List Motorola No. PEPS-34634-A (Sheet 2 of 2) 10/5/82 - V & G



TRN4859A Line Driver Module Circuit Board Detail, Schematic Diagram & Parts List Motorola No. PEPS-34634-A (Sheet 1 of 2)

10/5/82 - V & G

SHOWN FROM COMPONENT SIDE

COMPONENT SIDE BD DEPS-34478-0 SOLDER SIDE BD DEPS-34477-0 OL DEPS-33112-0

parts list

3 XMIT AUDIO MUTE 4 NOTCHED ROVE AUDIO

6 ALARM TONE 2

9 MODEM LINE +

10 MODEM LINE -

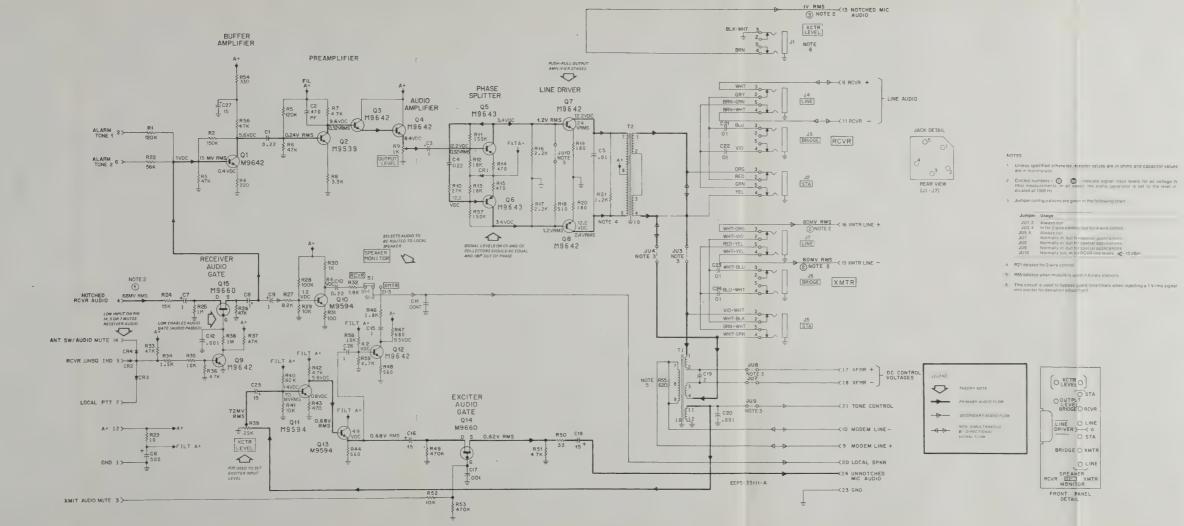
14 ANT SW/AUDIO MUTE

REFERENCE	MOTOROLA	P. 7640-0
SYMBOL	MOTOROLA PART NO.	DESCRIPTION
-		capacitor, fixed: uF + 10%; 50 V:
C1	0.000066314	un ess otherwise stated 0 22
C1 C2 C3	8-82905G11 21-82187B07	470 pF 500 V
C3	23-84538G01	1.0 + 20% 35V
Cá	8-82905G11	0.22
C5	8-82905G01	01
C6	23-83210A19	500 20 V
C7, 8, 9	23-84538G01	1 0 · 20%, 35 V 0.22
C10 C11	8-82905G11 21-82428B27	0.22
C12	21-82187B20	0847 100 V 001 100 V
C12 C13 14	21'02 10'020	NOTUSED
C13, 14 C15	23-84538G01	001 100 V NOTUSED 10 · 20%, 35 V 15 · 20%, 20 V
C16 C17	23-84538G01 23-84538G04	15 - 20° o 20 V -
C17	21-82187B20	
C 18 C 19	23 84538G04	15 20 20 v 2 C 200 v 001, 100 V
C20	8 563305 21;82187B20	001 1003
C21	8-82317801	001, 100 V 0 T 100 V
C22, 23, 24	21-82372C01	
C25	23-84538G04	15 ± 20% 20 V
C26	23-84538G01	10 + 35 V
C27	23-84538G04	15 ± 20% 20 V 10 + , 35 V 15 + 20% 20 V
		diode: (see note)
CR1 thru 4	48-83654H01	siticon
		connector, receptacle;
Ji thru 7	9-83073L02	phono
		transistor: (see note)
Q1	48-869642	NPN 1vne M9842
	48-869539	
Q3, 4 Q5, 6	48-869642	NPN, type M9539 NPN, type M9642 PNP, type M9643 NPN, type M9642 NPN type M9594
Q5, 6	48-869643 48-869642	PNP, type M9843
Q7, 8, 9 Q10, 11	48 869594	NPN, type M9042
012	48-869642	NPN, type M9642
D13	48-869594	NPN, type M9594
Q14, 15	48-869660	FET Type M9660
		resistor, lixed: ±5%; 1/4 W
81		unless otherwise stated 120k
H1 R2	6-11009C99 6-11009D02	120k 150k
R3	6-11009C89	47k
R4	6-11009C33	220
R5	6-11009C99	120k
R6	6-11009C89	47k
R7	6-11009C65	4.7k
B8	6-11009C61	3 3k
R9		var 1k
R10	6-11009CB3 6-11009D02	27k
R11	6-11009D02	150k
R12, 13	6 11009C79 6-11009C41	18k
R14, 15 R16, 17	6-11009C41 6-11009C57	470 2 2k
R18	6 11009C57	510
R19, 20	6.125031	180, 1/2 W
B21	6-11009C51	1.2k
R22	6-11009C51 6-11009C91	56k
R23	6-125A01 6-11009C77	10, 1/2 W
R24	6-11009C77	15k
R25 R26	6-11009D22 6-11009C89 6-11009C71	1.0 meg 47k
H26 R27	6-11009C09	47K 82k
H27 R28	6-11009C71	100k
R29	6-11009C73	10k
R30	6-11009C49	1k
R31	6-11009C25	100
R32	6-11009C55	1 8k
R33	6-11009CB1	47k
R34	6-11009C53 6-11009C73 6-11009C65 6-11009C81	1.5k
R35 R36	6-11009C/3	10k 4.7k
R36 R37	6 11009085	4.7k 47k
H37	6-11009C81 6-11009D22	47k 10 meg
R39	18-83083G16	var 25k
R40	6-11009C95	82k
R41	6-11009C73	10k
R42	6-11009C65	4 7k
R43	6-11009C41	470
R44	6 11009C43	560 NOT USED
R45	0.440000004	NOTOSES
R46	6-11009C55 6-11009C45 6-11009C43	1 8k 680
R47 R48	6-11009C45	580 560
R48 R49	6-11009C43 6-11009D14	560 470κ
R49	6-11009D14 6-11009C13	33
R51	6-11009C13	4 7k
R52	6-11009C73	10k
R53	6-11009D14	470k
R54	6-11009C37	330
		620
R55 R56	6-11009C44 6-11009C65	4.7k

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
R57	6-11009D02	₱50F
R58	6-11009C73	Į(O)×
R59	6 11009C65	μ 7κ
S1	40-83204B01	ppdt
		fransformer, line driver.
T1	25 83036L02	pins #7 and 9 dc resist = 110 ohms
		pins #1 and 2 dc resist = 25 ohms
		pins #3 and 4 dc resist = 25 ohms
		pins #11 and 12 dc resist = 250 ohms
T2	25 83036LQ1	ins #7 and 9 dc resist - 250 ohms
		tins #1 and 2 dc resist - 25 ohms bins #3 and 4 dc resist - 25 ohms
		pins v3 and 4 dc resist = 250 mins pins v11 and 12 dc resist = 250 ohms
	non	referenced items
	1-80761042	CIRCUIT BOARD
		roludes
	9-83697M01	RECEPTACLE, board mounting 24 used
	43-865080	BUSHING, Ihreaded, 2 used
	1-80761D40	PANEL, riveted Includes ref. items S1
	64-83163L09	PANEL PANEL
	4-82418897	IVASHER insulated
	3-134184	SCREW tapping, 4.40 x 5/16 2 used
	3-134184	SCREW tapping 4-40 x 5/16 2 used
	7 83164L01	BRACKET panel
	42 10217A02	STRAP Ne. 3 used
	45-83914G01	CARD guide 2 used
	45-63914001	DAND golde 2 daed

note: For optimum performance, diddes transistors, and integrated circuits must be ordered by Motorola part numbers.

MODEL TRN4859A



FUNCTION

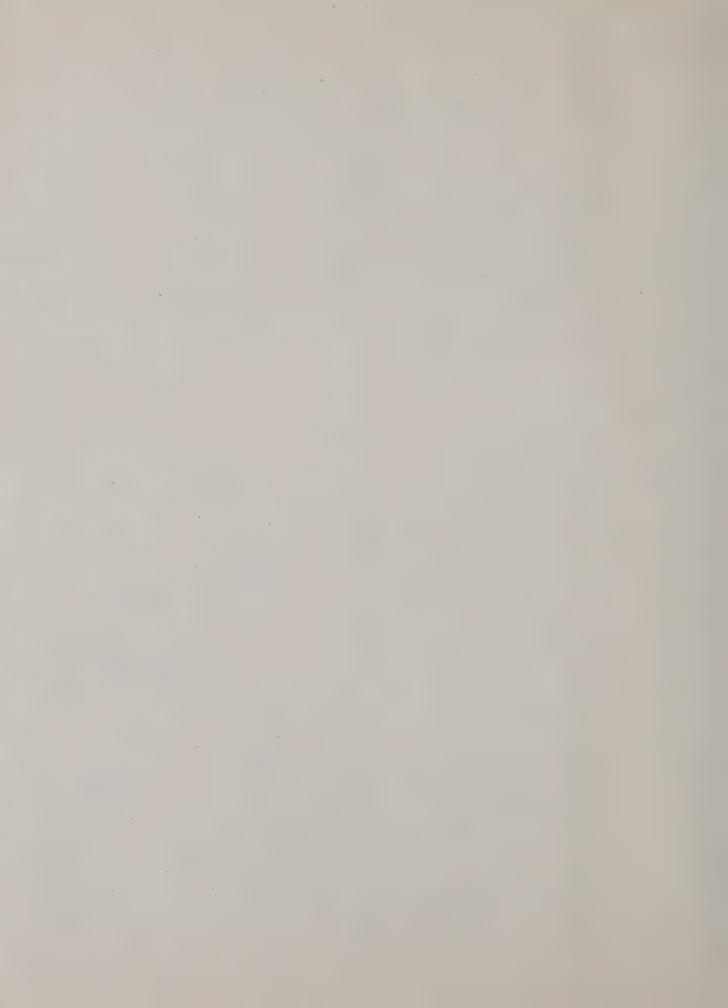
This module amplifies and gates incoming 600-ohm line audio to the transmitter. It also routes incoming modem tones for binary paging applications to the modem via a relay in the transmitter site interface module (TSI). The line driver also receives audio from an optional monitor or link receiver, gates and amplifies it so it is capable of driving a 600-ohm telephone line

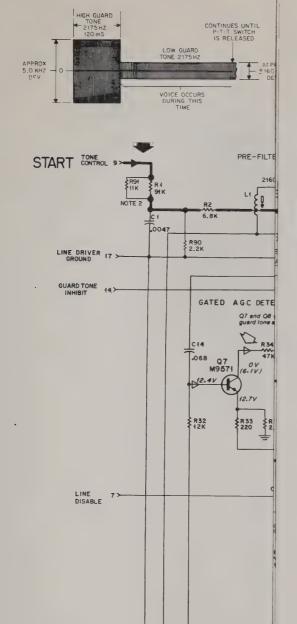
When the station has local speaker monitoring capability, a front panel mounted switch on the line driver selects either received or transmit audio which is routed to the local speaker. An amplifier circuit is located in both receive and transmit audio paths to drive the local speaker. Final amplifiers circuit.

The test jacks located on the front panel facilitate level settings. Three jacks are for receiver line audio measurements and an additional set of three jacks are for transmit line audio measurements. One bridging and two terminating jacks are provided in each set of three jacks mentioned above. An additional test jack labeled XCTR LEVEL is provided for injecting a test tone directly into the exciter audio circuitry for Instantaneous Devation Control (IDC) setting.

Jumpers in the module provide for either a 4-wire configuration (receive audio on a separate phone line from transmit audio) or a 2-wire configuration (receive and transmit audio combined on the same telephone line)

TRN4859A Line Driver Module Circuit Board Detail, Schematic Diagram & Parts List Motorola No. PEPS-34634-A (Sheet 2 of 2) 10/5/82-V-& G





GUARD TONE DECODER MODULE

MODEL TLN2376A

FUNCTION

This module detects 2175 Hz guard tone and converts it into line PTT signal which is required for remote key up of the transmitter. It also amplifies received function tones and distributes them to other function tone decoders in the station (for example the 1950 Hz tone detector in the F1 Control Module).

The automatic gain control circuitry in this module adjusts guard tone and function tone levels for proper operation of tone decoding circuitry independent of input levels to the remote control chassis of the station.

The activity detector stages sense the loss of low level guard tone. The fast turn off circuitry quickly turns off the line PTT signal so the station can rapidly enter the binary mode of operation or un-key the transmitter depending on the commands sent to the station.

This module also has a switchable bandpass filter to allow only the guard tone frequency to enter the module to provide falsing protection. After detection of guard tone, this filter is switched out during the time function commands are sent to the station and during this period, the tone decoders are enabled. This allows function tones of various frequencies to be amplified in the guard tone decoder prior to being sent to the respective function tone decoders. The switching of the filter is controlled by circuitry in the TRN4854A Station Control Module.

Mode	l Compl	lement
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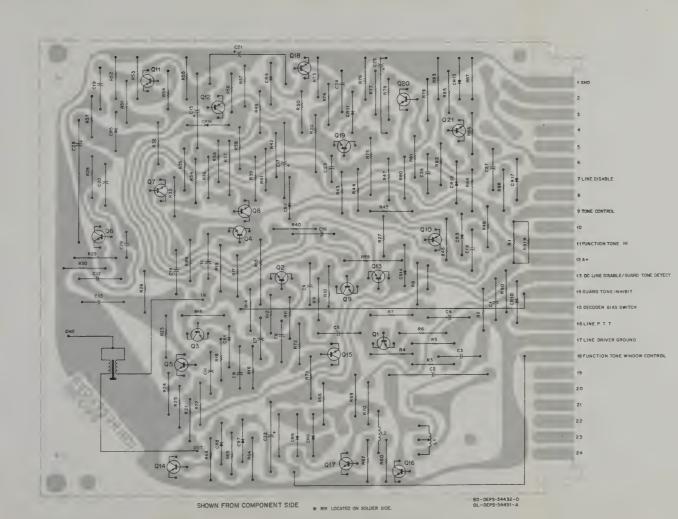
Model	Module	Reed
		(2175 Hz)
TLN2376A	TRN4892A	KLN6209A

n ohms: capacitor values are in

TRN4892A Guard Tone Decoder Module Circuit Board Detail Schematic Diagram & Parts List Motorola No. PEPS-34635-A (Sheet 2 of 2) 10/5/82 - V & G

Off when guard and function tone as detected to enable gated AGC and funct detectors. Turns on after loss of activity off PTT and disable gated AGC. Turn on is by C25 charge T5 ms to prevent loss of to line interruptions.

FUNCTION TONE 18 >



TRN4892A Guard Tone Decoder Module Circuit Board Detail Schematic Diagram & Parts List Motorola No. PEPS-34635-A (Sheet 1 of 2) 10/5/82 - V & G

parts list

7 LINE DISABLE

11 FUNCTION TONE HI

14 GUARD TONE INHIBIT 15 DECODER BIAS SWITCH 16 LINE P T T

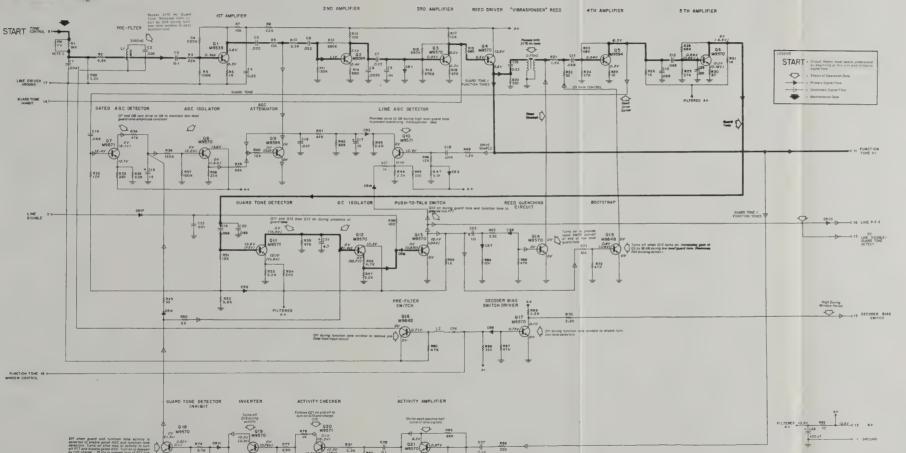
17 LINE DRIVER GROUND IS FUNCTION TONE WINDOW CONTROL

REFERENCE	MOTOROLA PART NO.	
SYMBOL	PART NO.	DESCRIPTION
		capacitor, fixed: uF ± 10%; 50 V; unless otherwise stated
C1	8-82905G26	.0047
C2	8-84325A29	.005 ± 2%
C2 C3 C4	8-82905G07	0.1 0.22
C4	8-82905G11	0.22
C5, 6, 7 C8	8-82905G02 8-82905G25	.022 .0033
C9	8-82905G25 8-82905G01	.0033
C10	8-82905G11	0.22
C11 thru 14	8-82905G11 8-82905G04	0.22 .068
C15	23-865136	15 ± 20%; 25 V
C16 C17	8-82905G03	.047 15 ± 20%; 25 V
C17 C18, 19, 20	23-865136 8-82905G04	15 ± 20%; 25 V .068
C21	23,885137	4.7 ± 20%: 25 V
C22	23-82783B08 21-82187B20	4.7 ± 20%; 25 V 1.0 ± 20%; 35 V .001; 100 V
C23	21-82187B20	.001; 100 V
C24 C25	8-82905G11 23-82783B12	0.22 4.7
C26	8-82905G07	0.1
C27	8-82905G11	0.22
C28	23-82601A25	100 + 150-10%; 20 V .001; 100 V
C29	21-82187B20	.001; 100 V
		semiconductor device, diode: (see n
CR1 thru 4	48-83654H01	silicon
CR10	48-83654H01	silicon
CR17	48-83654H01	silicon
		coll assembly industor
L1	1-80702B11	1 H: Incl. ground cits
12	24-82723H01	coll, assembly, Inductor: 1 H; Incl. ground clip choke; 1.2 uH
	48-869539	transistor. (see note) NPN; type M9539 NPN; type M9594
Q1 Q2	48-869539 48-869594	NPN: type M9539 NPN: type M9594
Q3, 4	48-869570	NPN; type M9570
Q5	48-869594	NPN: type M9594
Q6	48-889570	NPN: 1vpe M9570
Q7 Q8	48-889571 48-869570	PNP; type M9571 NPN; type M9570 NPN; type M9594
Q8 Q9	48-889594	NPN; type M9570 NPN: type M9504
O10. 11	48-889571	NPN; type M9571
Q12 thru 14	48-869570	NPN; type M9570
Q15	48-869648	NPN, type M9648
Q16 Q17 thru 19	48-869642 48-869570	NPN Type M9642
Q20 Q17 tnru 19	48-869571	NPN type M9642 NPN; type M9670 PNP; type M9571
Q21	48-869570	NPN; type M9570
		resistor, lixed: ±5%; 1/4 W;
		unless otherwise stated
R1	6-11009C96 6-11009C69	91k
R2	6-11009C69	6.8k
R3 R4	6-11009C81 6-11009D06	22k 220k
H4 R5	6.11009C97	100k
R6	6-11009C49	1k
R7	6-11009C49 6-11009C73 6-11009C81	10k
R8 R9	6-11009C81 6-11009C77	22k 15k
R9 R10	6-11009C77 6-11009C61	15K 3.3k
R11	6-11009D02	150k
R12	6-11009D18	680k 10k; 1/2 W
R13	6-11009D18 6-124A73 6-11009C45	10k; 1/2 W
R14 R15	6-11009C45 6-11009D18	680 680k
R16	6 11000000	270k
R17	6-11009C73 6-11009C41 6-11009C45 6-125A37	10k
R18	6-11009C41	470
R19	6-11009C45	680 330; 1/2 W
R20 R21	6-125A37 6-11009C53	330; 1/2 W 1.5k
H21 R22	6-11009C13	33
R23	6-11009C93	68k
R24	6-11009C83 6-11009C01 6-11009C49	27k
R25 R26, 27	6-11009C01	10 1k
R26, 27 R28	6-11009C49 6-11009C93	1k 68k
R29	6-11009C83	27k
R30	6-11009C11	27
R31	6-11009C49	1k
R32 R33	6-11009C75 6-11009C33 6-11009C89 6-11009C57	12k 220
R34	6-11009C89	47k
R35	6-11009C57	2.2k
R38	6-11009C99	120k
R37	6-125A97	100k; 1/2 W
R38	6-11009C81 8-11009C93	22k RBV
R39	6-11009C93	68k 10k
R41	6-125A97 6-11009C81 6-11009C93 6-11009C73 6-11009C89	47k
B42	8-11009C95	82k
R43.44	6-11009C57	2.2k
H43, 44 R45 R46	6-11009C37 6-11009C75	330 12k

REFERENCE	MOTOROLA PART NO.	DESCRIPTION
348	6-11009C51	1.2k
349.50	6-11009C13	33
151	6-11009C75	12k
152	6-11009C61	3.3k
152	8-11009C57	2.2k
154	B-11009C35	270
154	6-11009C89	47k
156	6-11009C65	47K
157	8-11009C57	2.2k
157 158	6-11009C37	100
	6-125A49	FIC: 1/2 W
159	6-120A49 6-11009C89	1K; 1/∠ VV 47k
360	B-11009C89	NOT USED
361		NOT USED NOT USED
362		
363		NOTUSED
164	6-11009C75	12k
165	6-11009C61	3.3k
166	6-11009C85	33k
67,68	6-11009C89	47k
69, 70	6-11009C57	2.2k
171	6-11009C73	10k
372	6-11009C89	47k
373	6-11009C49	1k
174	6-11009C61	3.3k
175	6-125A49	1k; 1/2 W
176	6-11009C49	1k
177	6-11009C63	3.9k
78	6-11009C49	1k
179	6-11009C57	2.2k
180	6-11009C25	100
81	6-11009C57	2.2k
182	6-11009C73	10k
83	6-11009C57	2.2k
84	6-11009C49	1k
85	6-11009C09	22
186	6-11009C93	68k
387	6-11009C83	27k
188	6-11009C37	330
189	6-11009C01	10
190	6-11009C57	2.2k
191	6-11009C74	11k
	m	echanical parts
	45-83914G01	GUIDE, card
	9-83697M01	RECEPTACLE, female: 15 used
	5-84220B01	BUSHING, 2 used
	3-84256M01	SCREW, machine: 4-40 x 5/16": 2 used
	46-84703E01	GUIDE, circuit bd.
	84-83128L01	PANEL

ERENCE	MOTOROLA PART NO.		DESCRIPTION
	KLN6209A	2175 Hz	

MODEL TLN2376A



FUNCTION

This module detects 2175 Hz guard tone and converts it into line PTT signal which is required for remote key up of the transmitter. It also amplifies received function tones and distributes them to other function tone decoders in the station (for example the 1950 Hz tone detector in the FI Control Module).

The automatic gain control circuitry in this module adjusts guard tone and function tone levels for proper operation of tone decoding circuitry independent of input levels to the remote control chassis of the station

The activity detector stages sense the loss of low level guard tone. The fast turn off circuitry quickly turns off the line PTT signal so the station can rapidly enter the binary mode of operation or un-key the transmitter depending on the commands sent to the station.

This module also has a switchable bandpass filter to allow only the guard tone frequency to enter the module to provide falsing protection. After detection of guard tone, this filter is switched out during the time function commands are sent to the station and during this period, the tone decoders are enabled. This allows function tones of various frequencies to be amplified in the guard tone decoder prior to being sent to the respective function tone decoders. The switching of the filter is controlled by circuitry in the TRN4854A Station Control Module.

	Model Complemen	
Model	Module	Reed
		(2175 Hz)
T1 N2376A	TRN4892A	KLN62094

TRN4892A Guard Tone Decoder Module Circuit Board Detail Schematic Diagram & Parts List Motorola No. PEPS-34635-A (Sheet 2 of 2) 10/5/82 - V & G

- 1 Unless otherwise indicated resistor values are In ohms, capacitor values are in
- microfarads
 2 R91 located on solder side of circuit board

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		capacitor, fixed: uF
C1	23-865136	15 ± 20%; 20 V
C2	21-82187B20	001 ± 10%; 100 V
C3 .	23-865136	15 ± 20%; 20 V .001 ± 10%; 100 V
C4 C5	21-82187B20 21-865136	15 ± 20%; 20 V
C6, 7, 8	21-82187B20	.001 ± 10%; 100 V
00, 7, 0	2.02.0.020	
		diode: (see note)
CR1 thru 4	48-83654H01	silicon silicon
CR5 CR6 thru 22	48-82466H13 48-83654H01	silicon (CR22 optional)
Ono tina EE	10 0000 11 10 1	
		lamp, incandescent:
DS1	65-83554G01	12 volts; 0.19 amp
		transistor: (see note)
Q1	48-869642	NPN; type M9642
Q2, 3	48-869643	PNP; type M9643
Q4	48-869642	NPN; type M9642
Q5	48-869643	PNP; type M9643
Q6	48-869568	NPN; type M9568
Q7	48-869643	PNP; type M9643 NPN; type M9642
Q8 Q9	48-869642 48-869568	NPN; type M9568
Q10, 11, 12	48-869642	NPN; type M9642
, · · · , ·		
		resistor, fixed: ±5%; 1/4 W;
D4	6-11009D02	unless otherwise stated 150k
R1 R2	6-11009C87	39k
R3	6-11009C39	390
R4	6-11009C49	1k
R5	6-11009C61	3.3k
R6	6-11009C45	680
R7	6-11009C01	10
R8	6-11009C71	8.2k
R9 R10	6-11009C89 6-11009C71	47k 8.2k
R11	6-11009C45	680
R12	6-11009C61	3.3k
R13	6-11009C45	680
R14	6-11009C01	10
R15	6-11009C89	47k
R16	6-11009C49	1k
R17	6-11009C37	330 3.3k
R18 R19	6-11009C61 6-11009C45	680
R20	6-11009C01	10
R21	6-11009C73	10k
R22, 23	6-11009C59	2.7k
R24, 25	6-11009C73	10k
R26	6-11009C57	2.2k
R27	6-11009C73	10k
R28	6-11009C61	3.3k 1.5k
R29 R30	6-11009C53 6-11009C69	6.8k
R31	6-11009C73	10k
R32	6-11009C53	1.5k
R33, 34	6-11009C57	2.2k
R35	6-11009C49	1k
R36, 37	6-11009C73	10k
R38, 39	6-11009C97	100k
R40, 41	6-11009C73 6-11009C97	10k 100k
R42 R43	6-11009C97	3.3k
1140	0 1 1000001	
	10.0016	switch:
S1	40-83468E01	slide; spdt
S2, 3	40-83204B01	slide; dpdt
		integrated circuit: (see note)
U1	51-82884L63	Schmitt trigger inverter
U2	51-82884L13	D flip-flop
U3	51-82884L04	quad NOR gate
		echanical parts
	1-80761D38	PANEL, screened; includes: S1, 2, 3
	9-84285C01	LAMPHOLDER, single contact
	61-855798	JEWEL, lamp GRN
	46-84603E01 45-83914G01	GUIDE, circuit board GUIDE, card; 2 used

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.

MODEL TRN4854B

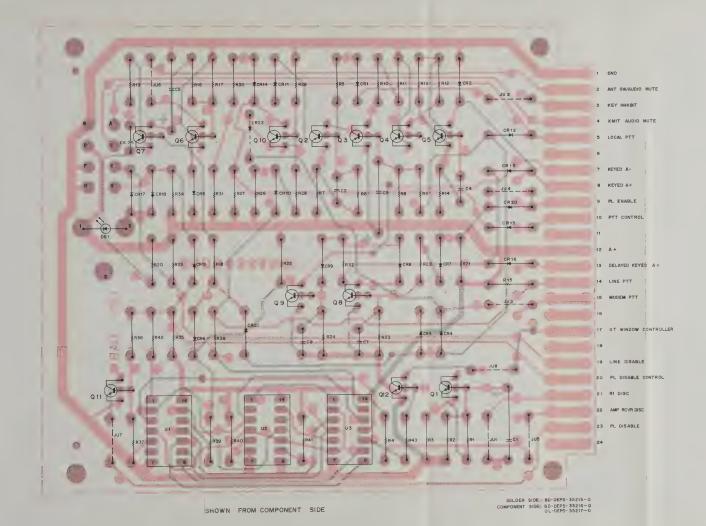
FUNCTION

This module integrates control functions from other modules in the station to key the transmitter. Keyed A + and a A - voltages are generated in this module to provide transmitter turn on. Local transmitter keying is accomplished via a panel mounted "XMIT" switch. The LINE DISABLE and PL DISABLE switch also on the front panel, are used to disable remote keying for maintenance purposes, and the PL DISABLE switch is used for local channel monitoring in those cases where a monitor or link receiver is used.

Other circuitry in the model provides for control of the prefilter on the guard tone decoder module. This allows for function tones to pass through the guard tone decoder at the proper time in route to function tone decoder modules such as the F1 control module.

TRN4854B Station Control Module Circuit Board Detail, Schematic Diagram & Parts List Motorola No. PEPS-35213-O (Sheet 2 of 2) 9/24/82 - V&G

MODEL TRN4854B

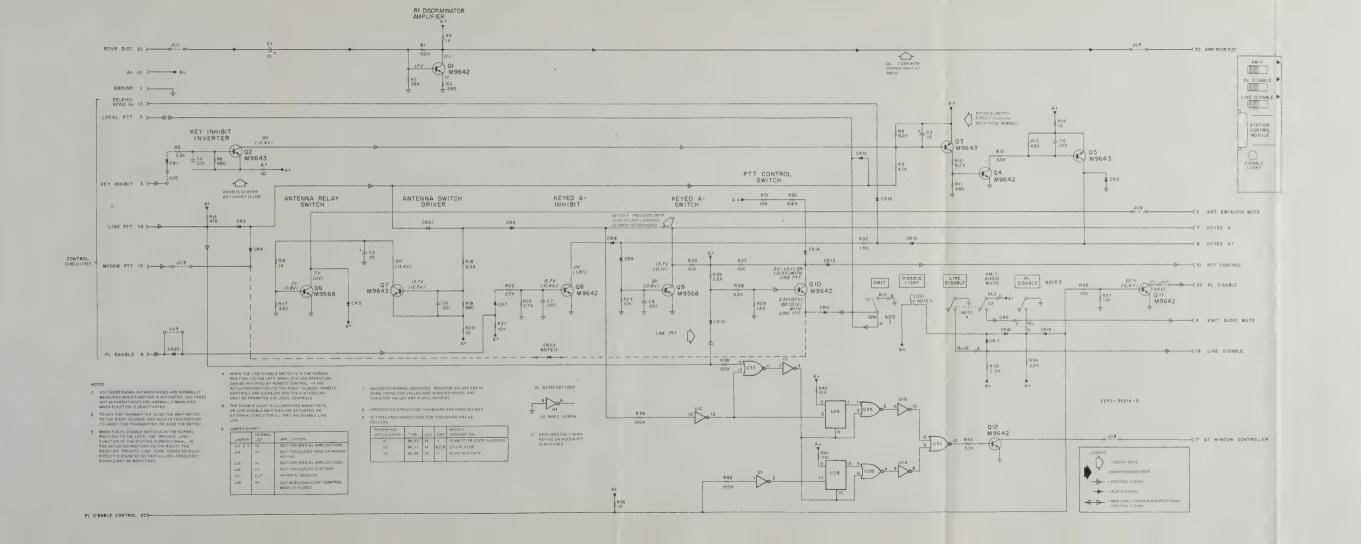


TRN4854B Station Control Module Circuit Board Detail, Schematic Diagram & Parts List Motorola No. PEPS-35213-O (Sheet 1 of 2) 9/24/82. V&G

parts list

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	
		capacitor, fixed: uF	
C1	23-865136	15 ± 20%; 20 V	
	21-82187B20	001 ± 10%; 100 V	
C2 C3	23-865136	15 ± 20%; 20 V	
C4	21-82187B20	.001 ± 10%, 100 V	
C5	21-865136	15 ± 20%; 20 V	
		.001 ± 10%; 100 V	
C6, 7, 8	21-82187B20		
CR1 thru 4	48-83654H01	diode: (see note) silicon	
CR5	48-82466H13	silicon	
CR6 thru 22	48-83654H01	silicon (CR22 optional)	
DS1	65-83554G01	lamp, incandescent: 12 volts; 0.19 amp	
201	00 0000 1001		
Q1	48-869642	transistor: (see note) NPN; type M9642	
Q2. 3	48-869643	PNP; type M9643	
Q4	48-869642	NPN; type M9642	
Q5	48-869643	PNP, type M9643	
Q6	48-869568	NPN; type M9568	
Q6 Q7	48-869643	PNP; type M9643	
Q8	48-869642	NPN; type M9642	
Q8 Q9	48-869568	NPN; type M9568	
Q9 Q10, 11, 12	48-869642	NPN; type M9642	
		resistor, fixed: ±5%; 1/4 W;	
		unless otherwise stated	
R1	6-11009D02	150k	
R2	6-11009C87	39k	
R3	6-11009C39	390	
B4	6-11009C49	1k	
R5	6-11009C61	3.3k	
R6	6-11009C45	680	
B7	6-11009C01	10	
R8	6-11009C71	8.2k	
R9	6-11009C89	47k	
R10	6-11009C71	8.2k	
R11	6-11009C45	680	
R12	6-11009C61	3.3k	
R13	6-11009C45	680	
R14	6-11009C01	10	
R15	6-11009C89	47k	
R16	6-11009C49	1k	
B17	6-11009C37	330	
R18	6-11009C61	3.3k	
R19	6-11009C45	680	
R20	6-11009C01	10	
R21	6-11009C73	10k	
R22, 23	6 11009C59	2 7k	
R24, 25	6 11009C73	10k	
R26	6-11009C57	2.2k	
R27	6-11009C73	10k	
R28	6-11009C61	3.3k	
R29	6-11009C53	1.5k	
R30	6-11009C69	6.8k	
B31	6-11009C73	10k	
R32	6-11009C53	1.5k	
R33, 34	6-11009C57	2.2k	
R35	6-11009C49	1k	
R38, 37	6-11009C73	10k -	
R38, 39	6-11009C97	100k	
H38, 39 R40, 41	6-11009C97 6-11009C73	100x 10k	
H40, 41 R42	6-11009C73 6-11009C97	100k	
R42	6-11009C97 6-11009C61	3.3k	
		switch:	
S1	40-83468E01	slide, spdt	
S2, 3	40-83204B01	slide, dpd1	
		integrated circuit: (see note)	
U1	51-82884L63	Schmitt trigger inverter	
U2	51-82884L13	D flip-flop	
U3	51-82884L04	quad NOR gate echanical parts	
	1-80761D38	PANEL, screened; Includes: S1, 2, 3	
	9.84285C01	LAMPHOLDER, single contact	
	61-855798	JEWEL, lamp GRN	
	46-84603E01	GUIDE, circu 1 board	
	45-83914G01	GUIDE, circu 1 board GUIDE, card; 2 used	
		SCREW, machine, 4 40 x 5 16 2 use	

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.



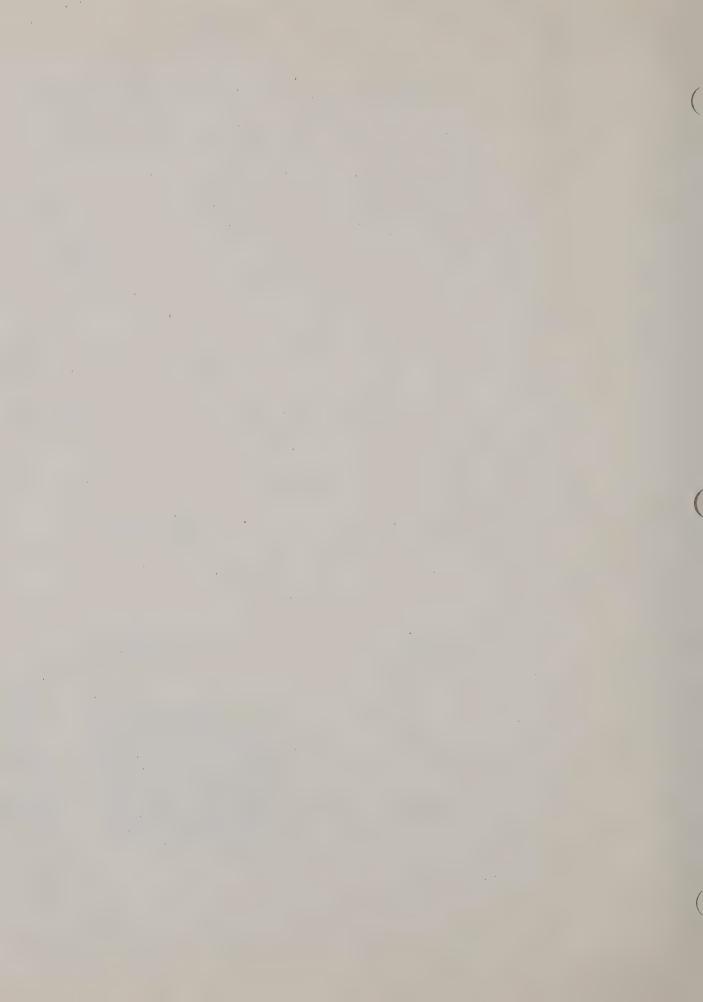
MODEL TRN48541

FUNCTION

This module integrates control functions from other modules in the station to kev the transmitter. Keved A + and a A - voltages are generated in this module to provide transmitter turn on. Local transmitter keying is accomplished via a panel mounted "XMIT" switch. The LINE DISABLE and PL DISABLE switch also on the front panel, are used to disable remote keying for maintenance purposes, and the PL DISABLE switch is used for local channel monitoring in those cases where a monitor or link receiver is used.

Other circuitry in the model provides for control of the prefilter on the guard tone decoder module. This allows for function tones to pass through the guard tone decoder at the proper time in route to function tone decoder modules such as the F1 control module

TRN4854B Station Control Module Circuit Board Detail, Schematic Diagram & Parts List Motorola No. PEPS-35213-O (Sheel 2 of 2) 9/24/82. V&G



MODEL TRN4854A



MUTE

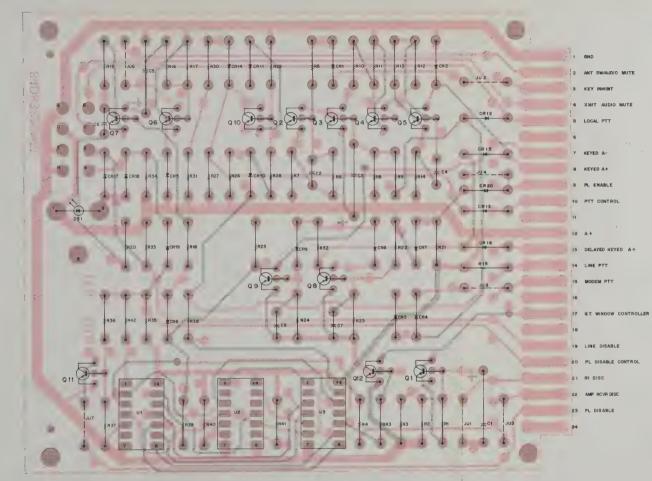
MUTE

NTROLLER

FUNCTION

This module integrates control functions from other modules in the station to key the transmitter. Keyed A + and A- voltages are generated in this module to provide transmitter turn on. Local transmitter keying is accomplished via a panel mounted "XMIT" switch. The LINE DISABLE and PL DISABLE switches also on the front panel, are used to disable remote keying for maintenance purposes, and the PL DISABLE switch is used for local channel monitoring in thoses cases where a monitor or link receiver is used.

Other circuitry in the module provides for control of the prefilter on the guard tone decoder module. This allows for function tones to pass through the guard tone decoder at the proper time in route to function tone decoder modules such as the F1 control module.



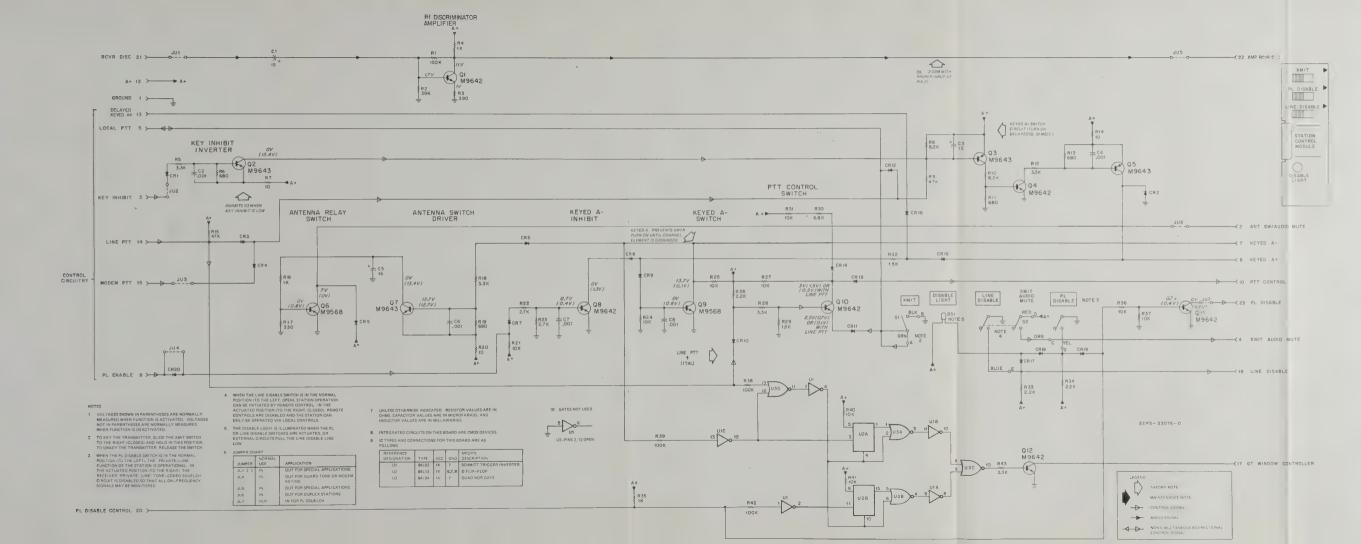
SHOWN FROM COMPONENT SIDE

TRN4854A Station Control Module Circuit Board Detail, Schematic Diagram & Parts List Motorola No. PEPS-34636-0 (Sheet 1 of 2) 5/12/82 - V & G

SOLDER SIDE #80-DEPS-34436-0 COMPONENT SIDE #80-DEPS-34435-0 OL-DEPS-34434-0

parts list

REFERENCE	MOTOROLA PART NO.	DESCRIPTION
OTMOUL	FARTING.	
	00.005+00	capacitor, fixed: uF
C1	23-865136	15 ± 20%, 20 V 001 ± 10%, 100 V
C2	21-82187B20	001 + 10%, 100 V
D3	23-865136	15 ± 20%; 20 V 001 ± 10%, 100 V
D4	21-82187B20	001 ± 10%, 100 V
D5	21-865136	
C6, 7, 8	21-82187B20	.001 + 10%, 100 V
		diode. (see note)
CR1 thru 4	48-83654H01	silicon
CR5	48-82466H13	silicon
CR6 thru 20	48-83654H01	silicon
		lamp, incandescent:
DS1	65-83554G01	12 volts 0.19 amp
		transistor: (see note)
D1	48-869642	NPN, 1ype M9642
Q2, 3	48-869643	NPN, 1ype M9642 PNP 1ype M9643
04	48-869642	NPN, type M9642
	48-869643	PNP, type M9643
Q6	48-869568	NPN type M9568
		NPN, type M9568 PNP type M9643
07	48-869643	FIRE TYPE MISONS
08	48-869642 -	NPN Type M9642
Ω9	48-869568	NPN, type M9568
Q10, 11, 12	48-869642	NPN type M9642
		resistor, fixed: ±5%; 1/4 W;
		unless otherwise stated
R1	6-11009D02	150k
R2	6-11009C87	39k
R2	6-11009C37	390
	6-11009C39 6-11009C49	1k
R4	0-11009049	
R5	6-11009C61	3 3 k
R6	6-11009C45	680
R7	6-11009C01	10
R8	6 11009C71	8.2k
R9	6-11009C89	47k
R10	6-11009C71	8.2k
R11	6-11009C45	680
R12	6-11009C61	3.3k
R13	6-11009C45	680
H13 R14	6-11009C45 6-11009C01	10
	C 44000C01	
R15	6-11009C89	47k
R16	6-11009C49	tk
R17	6-11009C37	330
R18	6-11009C61	3.3k
R19	6-11009C45	680
R20	6:11009C01	10
R21	6 11009C73 6-11009C59	10k
R22, 23	8.11009C50	2.7k
H22, 23 R24 25	6 11009C59	10)
DOC SO	6 11009C/3	2.24
R26	6 11009C57	
R27	6-11009C73	10k
R28	6-11009C61	3.3k
R29	6-11009C53	1.5k
R30	6-11009C69	6.8k
R31	6-11009G73	10k
R32	6-11009C53	1.5k
H32 H33, 34	6-11009C57	2 2k
POS, 39	6-11009C57 6-11009C49	2 2k 1k
R35	b-11009G49	
R36, 37	6-11009C73	10k
R38, 39	6-11009C97	100k
R40, 41	6-11009C73	10k
B42	6-11009C97	100k
R43	6-11009C61	3 3k
		switch:
S1	40-83468E01	slide, spdt
S2, 3	40-83204B01	slide, dpdt
		Integraled circuit (see note)
U1	51-82884L63	Integrated circuit: (see note) Schmitt trigger inverter
112	51-828841 13	D flip-flop
U2 U3	51-82884L13 51-82884L04	quad NOR gate
		echanical parts
	1-80761D38	PANEL screened; includes S1, 2, 3
	9-84285C01	1 AMPHOLDER single contact
		ICIAICI James CERI
	61-855798	JEVVEL IBMP GHN
	46 84603E01	JEWEL lamp GRN GUIDE circuit board GUIDE card, 2 used
	45-83914G01 3-125790	SCREW machine, 4-40 x 5/16" 2 used



STATION CONTROL MODULE MODEL TRN4854A

FUNCTION

modules in the station to key the transmitter. Keyed A and A-voltages are generated in this module to provide maintenance purposes, and the PL DISABLE switch i



MOTOROLA INC.

Communications Sector

ALARM LOGIC MODULE

MODEL TRN4857A

1. GENERAL

The alarm logic module is used in a Motorola radio paging station. It provides an alarm output for any of three alarm conditions: audio alarm, rf alarm, or system alarm. The alarm output is provided by the contacts of relay K1, located on the circuit board. The relay contacts are rated at 500 mA maximum, 100 V dc maximum, and 15 watts maximum.

2. INSTALLATION

- 2.1 The alarm logic module is supplied with two card guides that allow the module to be installed in either a unified or non-unified remote control chassis in the station.
- 2.2 On stations using a unified remote control chassis, the alarm logic module is installed in position 7. The relay contact output is available at TB3-2 and TB3-3 on the interconnect board. On stations using a non-unified remote control chassis, the alarm logic module is installed in position 6. The relay contact output is available at TB2-3 and TB2-5 on the interconnect board.

3. POWER THRESHOLD ADJUSTMENTS

- Step 1. Remove module from remote control chassis and place on extender card.
- Step 2. Preset the following controls as viewed from the module front panel. (Refer to circuit board detail for location of controls.)
- RF Forward (R18) fully counterclockwise
- Audio (R9) fully counterclockwise
- RF Reverse (R23) fully clockwise
- Disable System Timer by setting switch S4 to "ON"

- Step 3. Install module and card extender into remote control chassis.
- Step 4. Connect a jumper from J100-13 on the remote control interconnect board to the forward power terminal (white) on the wattmeter. Make sure the red (reverse power) wire is not connected to J100-13.
- Step 5. Set wattmeter to Fwd High. Keying into a 50 ohm load, set output power to 18% of rated output power of the station.
- Step 6. Rotate the RF Reverse control (R23) on the alarm logic module, until the alarm LED just lights.
- Step 7. Disconnect the jumper stated in Step 4, and connect the red (reverse power) wire from the wattmeter to J100-13.
- Step 8. Tune transmitter to 50% of rated output power.
- Step 9. Rotate the RF Forward control (R18) on the alarm logic module, until the alarm LED just lights.
- Step 10. Tune the station to rated power output.

4. AUDIO LEVEL ADJUSTMENT

- 4.1 The alarm logic module modulation check requires that the initial burst of high level guard tone be used to verify proper audio level. Any control configuration which does not begin the keying sequence with high level guard tone, requires the modulation check to be disabled on the alarm logic module. To disable the modulation check, turn R9 on the alarm logic module fully counterclockwise.
- 4.2 If the modulation check is to be used to verify proper audio level, the audio trip point must be set

by R9, to a point 6 dB below the normal level of high level guard tone. Follow the procedure outlined in Steps 1 and 2.

NOTE

The station must be in normal operating condition before the audio trip point on the alarm logic module is set (phone line and exciter level adjustments must be set at normal levels). Any change in exciter level adjustment requires readjustment of the audio trip point on the alarm logic module.

- Step 1. Apply a 2175 Hz sine wave at a level 6 dB below normal high level guard tone to the phone line.
- Step 2. Monitor the voltage at pin 7 of U1 on the alarm logic module and adjust audio control R9 until this voltage just drops to near ground.

5. SYSTEM TIMER PROGRAMMING

5.1 Dip Switch S1 (actually S1-S8) is used to program the system timer. Positions 1, 2 and 3 are not used (always in "ON" position). Position 4 is used to disable the timer. If S4 is "on" the timer is disabled. If S4 is "off" the timer causes a system alarm at a programmable time after loss of push-to-talk. Positions 5, 6, 7 and 8 are used to program the timer. The following table gives approximate times for each combination of switch positions.

Table 1. System Timer Programmable Times

S8	S7	S 6	S5	Time
0	0	0	0	10 seconds
0	0	. 0	1	21 seconds
0	0	1	0	42 seconds
0	. 0	. 1	1 1	1.5 min.
0	1	0 .	0	2.8 min.
0	1	0	1	5.7 min.
0	-1 \sim $^{-1}$	1 4	0	11.3 min.
0	1	1 1	1 '	23 min.
1	'. 0	0	0	45 min.
1	0	0	1	1.5 hr.
1	0	1	0	3 hr.
1	0	1	1	6 hr.
1	1	0	0	12 hr.
1	1	0	.1	1 day
1	. 1	. 1	0	2 days
1	, . 1	. 1	1	4 days

0 = ON1 = OFF

5.2 An example is shown in Figure 1, on how dip switch S1 is set to program the system timer to produce an alarm 45 minutes after loss of push-to-talk. Refer to Figure 1.

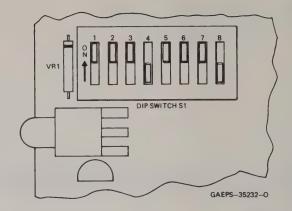


Figure 1. Timer Set to Alarm 45 Minutes After Loss of Push-To-Talk

6. ALARM LOGIC MODULE JUMPERING INFORMATION

The relay contacts may be jumpered to either open or close on an alarm or on verification. The alarm logic module is shipped with jumpers set to close the contacts on an alarm. See jumper table on the schematic diagram for other possible jumper configurations.

7. THEORY OF OPERATION

7.1 AUDIO ALARM

Integrated circuit U1C amplifies the unnotched microphone audio and applies it to level detector CR1 and C5. It is then applied to U1B-5, which compares the audio level with a reference level set by R9 at U1B-6. The reference level is set for an audio level of 6 dB below normal high level guard tone. During high level guard tone, delayed keyed A+ is inverted by U2A-2, and applied to latch U3B and U3C. If high level guard tone is of sufficient level, a logic low ("0") is latched at U3C-10. This indicates there is no audio alarm. If high level guard tone is degraded by more than 6 dB, a logic high "1" appears at U3C-10, indicating an audio alarm at pin 17.

7.2 RFALARM

7.2.1 Operational amplifier U1D samples the forward power (pin 22) as detected by the wattmeter. the forward power is compared to a reference level set by R18. The reference level is set to one-half of the rated power, a logic high ("1") appears at U3A-3, indicating

an rf failure. In a similar manner U1A samples the reflected power (pin 8) and compares it to a reference level set by R23 (18% of station power). If the reflected power exceeds the pre-set limit, a logic high ("1") appears at U3A-3, indicating an rf alarm.

7.2.2 Transistor Q9 is a constant current source for Zener diode VR1. VR1 is a precision temperature compensated voltage reference, that is used by the audio and rf comparators.

7.3 SYSTEM ALARM

Integrated circuit U6 is a programmable timer. C10 and R35 form an RC time constant for an oscillator that is divided by 24 flip-flop stages; the last 16 stages are selectable by a four-bit binary code programmed by switches S5, 6, 7, and 8. Switch S4 can be closed to disable the timer completely. The timer is reset by Q7 via CR2, CR3, or CR4, whenever there is a push-to-talk function. C13 causes the timer to reset on initial power up. If a push-to-talk function does not occur within a predetermined time limit, a system alarm occurs via Q3.

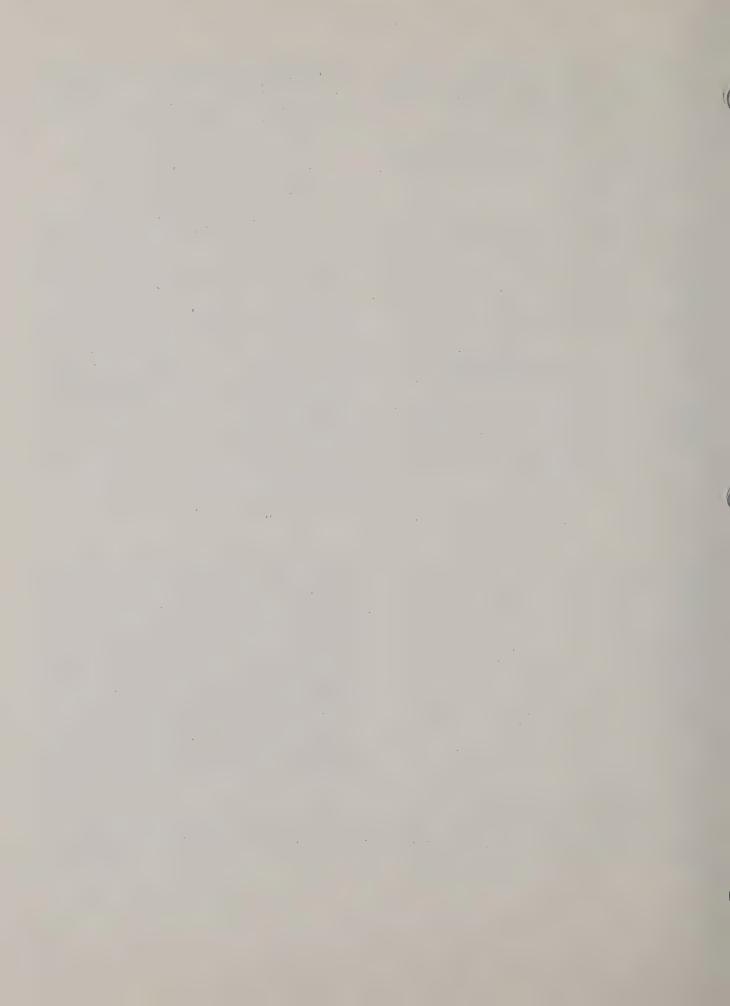
7.4 VERIFICATION LOGIC CIRCUITRY

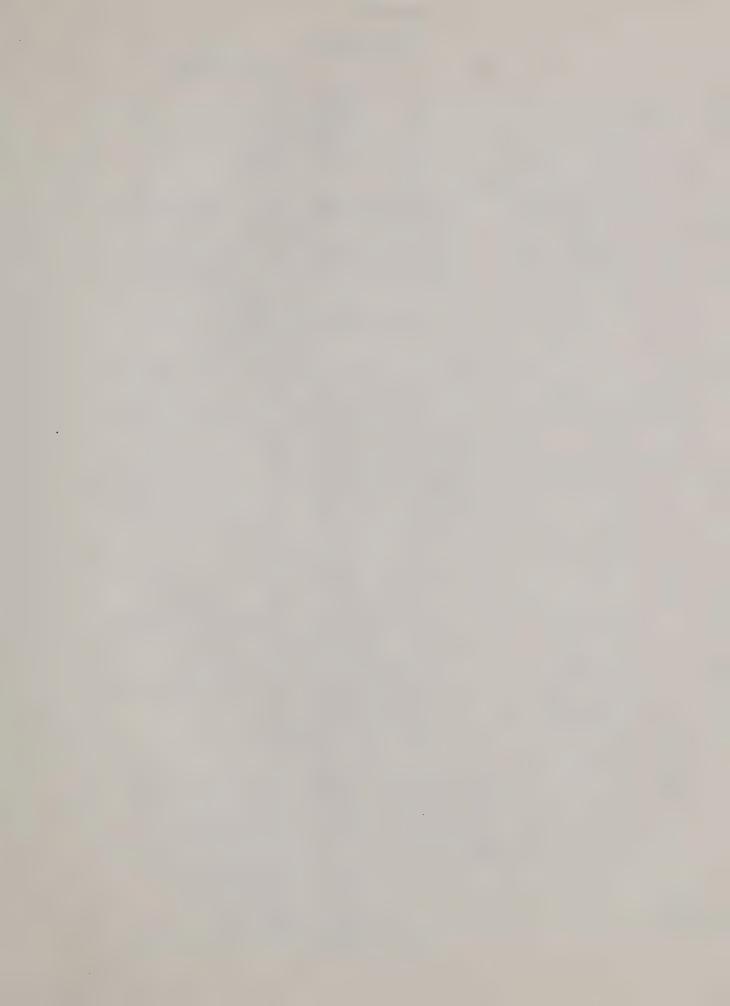
The verification logic circuit consists of U4 and U2B, C, and F. When a channel element ground appears at pin 3 and an audio signal appears at pin 11 with

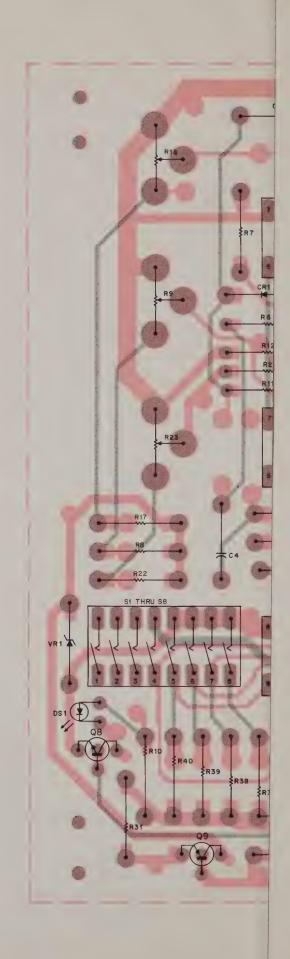
rated rf power at pin 22, a logic high appears at the output of U4B-4. If JU2 is in, relay K1 is activated to provide verification. Transistors Q4 and Q5 supply open collector outputs to indicate the station is keyed up in the binary mode (Q4) or the tone mode (Q5).

7.5 ALARM LOGIC CIRCUITRY

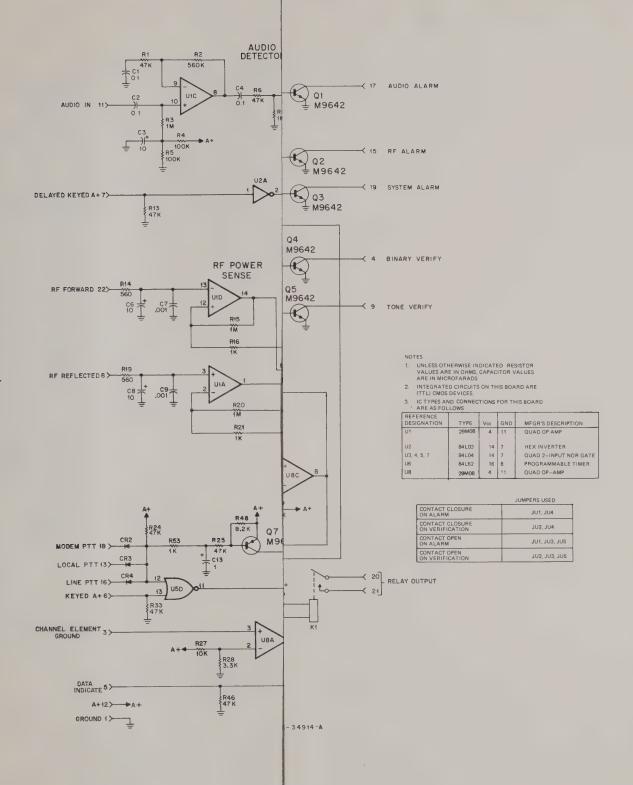
The alarm logic circuitry consists of U5, U2D, E, and U8C. U5 detects any of the alarm conditions (audio, rf, or system). Upon detection of an alarm, U5A-3 goes low, causing U2D-8 to go high. The output of U2D is applied to R41, C12, and U8C, to form a time delay that blocks transient alarm conditions that occur during the key-up sequence. The output of U8C is at a logic high ("1") when an alarm condition exists. The output of U8C-8 is routed to JU1, which can be connected to operate K1 relay. The alarm signal also lights the front panel alarm LED (DS1) via Q8. During an alarm condition U7 decodes the type of alarm. Transistors Q1, Q2, and Q3 provide open collector outputs to indicate an audio alarm (Q1), and rf alarm (Q2), or a system alarm (Q3).



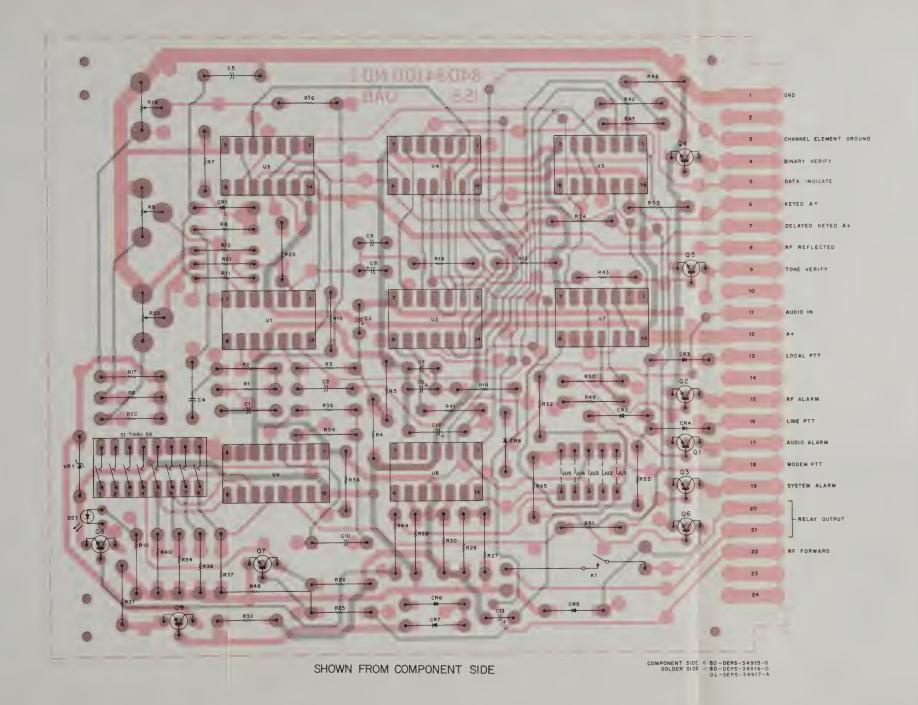




TRN4857A Alarm Logic Module Schematic Diagram, Circuit Board Detail & Parts List Motorola No. PEPS-34991-O (Sheet 1 of 2) 8/31/82 - V&G



TRN4857A Alarm Logic Module Schematic Diagram, Circuit Board Detail, & Parts List Motorola No. PEPS-34991-O (Sheet 2 of 2) 8/31/82 - V&G

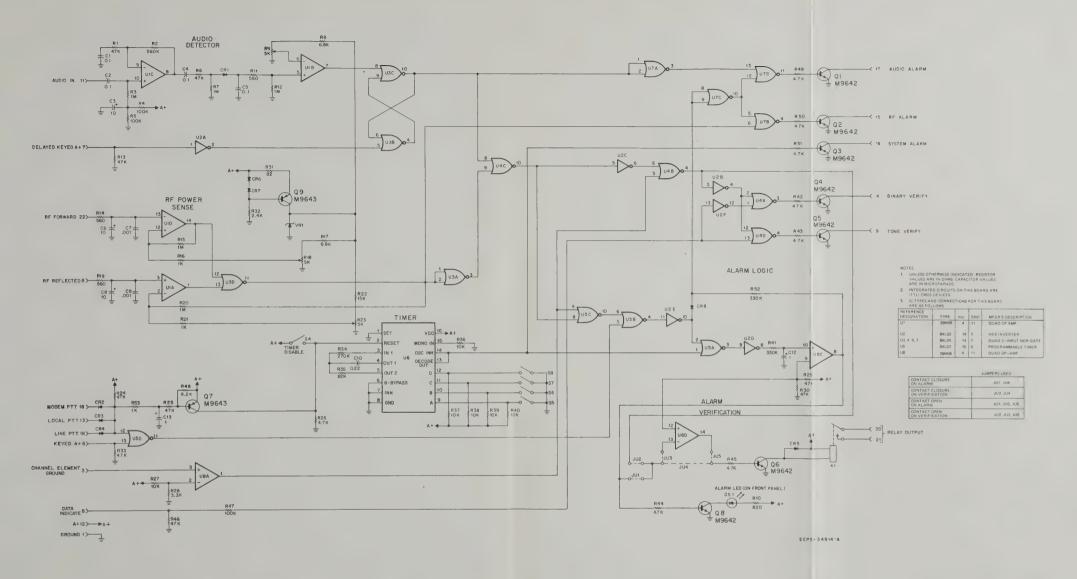


TRN4857A Alarm Logic Module Schematic Diagram, Circuit Board Detail & Parts List Motorola No. PEPS-34991-O (Sheet 1 of 2) 8/31/82 - V&G

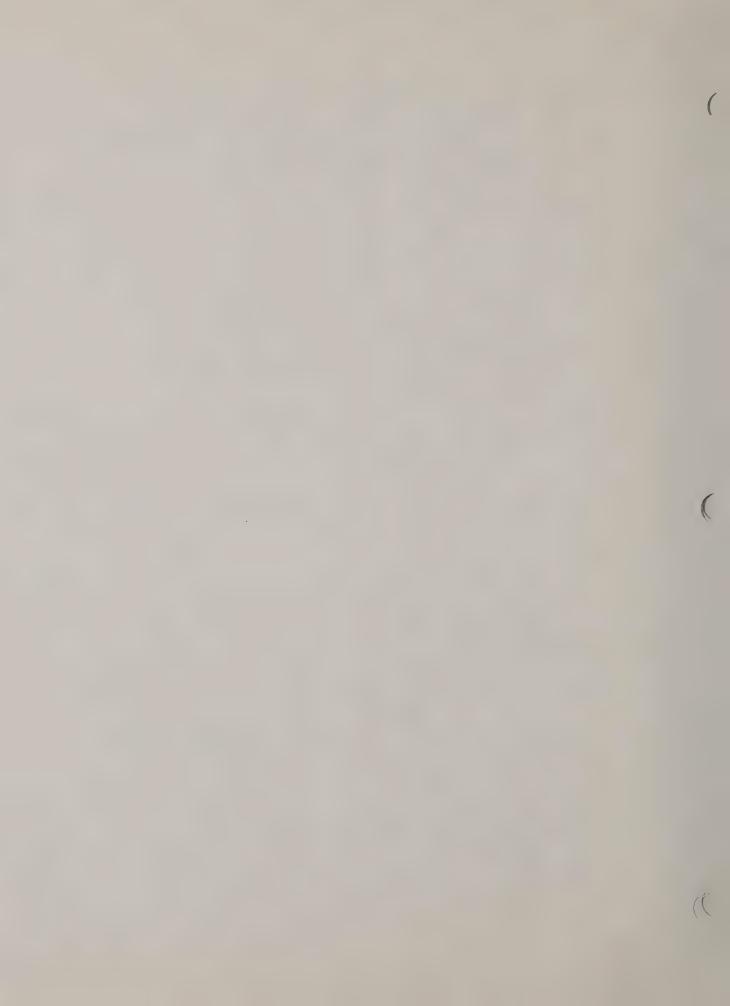
parts list

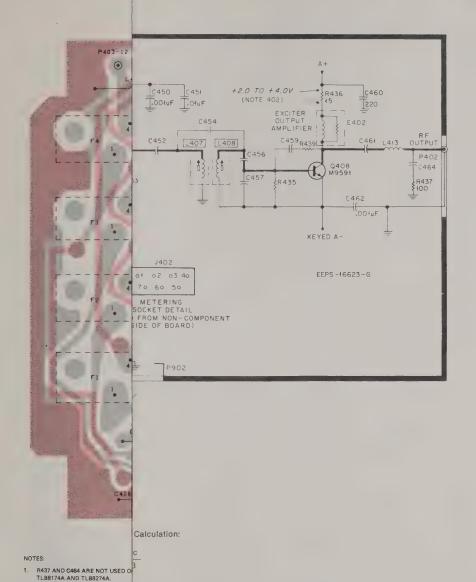
REFERENCE	MOTOROLA	
SYMBOL	PART NO.	DESCRIPTION
		capacitor, fixed: ± 10%; 100 V; unless otherwise stated
C1, 2	8-84637L14	0.1 uF
C3	23-11013C54	10 uF ± 20%; 15 V
C4, 5	8-84637L14	0.1 uF
C6	23-11013C54	10 uF ± 20%: 15 V
C7	21-11015B13	.001 uF
C8	23-11013C54	10 uF ± 20%; 15 V
C9	21-11015B13	001 uE
C10	8-84637L44	
C10 C11		NOTUSED
C12	23-84538G14	1 uF; 35 V 1 uF; 20 V
C13	23-11013D01	1 uF; 20 V
		diade (ess ants)
CR1, 2, 3, 4	48-83654H01	diode: (see note) silicon
CR5	48-82466H13	silicon
CR6, 7, 8	48-83654H01	silicon
		light emitting diode:
DS1	48-88245C28	red
	80-82617M01	relay:
K1	80-82617M01	1 form A; coil res. 820
		transistor. (see note)
Q1 thru 6	48-869642	NPN; type M9642
Q7 thru 6	48-869643	PNP: type M9643
Q8	48-869642	PNP; type M9643 NPN; type M9642
Q9	48-869643	PNP; type M9643
		resistor, fixed: ±5%; 1/4 W
		unless otherwise stated
R1	6-11009C89	47k
R2	6-11009D16	560k
R3	6-11009D22	1 meg
R4, 5	6-11009C97	100k
R6	6-11009C89	47k
R7	6-11009D22	1 meg
R8	6-11009C69	6.8k
R9	18-83083G07	variable; 5k
R10	6-11009C47	820 560
R11 R12	6-11009C43 6-11009D22	
R12	6.11009022	1 meg 47k
R14	6-11009C89 6-11009C43	560
R15	6-11009D22	1 meg
R16	6-11009C49	1k
R17	6-11009C69	6.8k
R18	18-83083G07	variable; 5k
R19	6-11009C43	560
R20	6-11009D22	1 meg
R21	6-11009C49	1k
R22	6-11009C49 6-11009C77	15k
R23	18-83083G07	variable; 5k
R24, 25	6-11009C89	47k
R26	6-11009C65	4.7k
R27	6-11009C73	10k
R28	6-11009C61	3.3k
R29, 30	6-11009C89	47k
R31	6-11009C23	82
R32 R33	6-11009C58 6-11009C89	2.4k 47k
R33	6-11009C89 6-11009D08	97K 270k
H34 R35	6.11009006	270k 82k
R36 thru 40	6-11009C95 6-11009C75	10k
R41	6-11009D10	330k
R42 thru 45	6-11009C65	4.7k
R46	6-11009C89	47k
R47	6-11009C97	100k
R48	6-11009C71	8.2k
R49, 50, 51	6-11009C65	4.7k
R52	6-11009D10	330k
R53	6-11009C49	1k
		10.10
S1	40-83022M03	switch:
	-10-0002ZW03	8-position: (spst)
		integrated circuit: (see note)
U1	51-83629M08	quad op-amplifier
U2	51-82884L03	hex inverter
U3, 4, 5	51-82884L04	quad 2-input NOR gate
U6	51-82884L62	programmable timer
U7	51-82884L04	quad 2-input NOR gate
U8	51-83629M08	quad op-amplifier
VR1	48-82372L04	voltage regulator:
****		Zener type; 6.25 V
		echanical parts
	3-125790	SCREW, machine: 4-40 x 5/16"; 2 used
	45-83914G01	GUIDE, card; 2 used
	45-00514001	
	46-84703E01	
	46-84703E01 64-83163L19 9-83697M01	GUIDE, circuit board PANEL, screened RECEPTACLE, board mounting; 24 used

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.



TRN4857A Alarm Logic Module Schematic Diagram, Circuit Board Detail, & Parts List Motorola No. PEPS-34991-O (Sheet 2 of 2) 8/31/82 - V&G





COMPONENT VALUE TARL

CO	MPONENT	VALUE TABL	.E
COMPONENT	FREQU	ENCY RANG	E (MHz)
AFFECTED	30-36	36-42	42-50
C430	180	130	91
C432	390	250	175
C433	300	190	160
C438	56	39	24
C440	75	47	36
C441	220	180	60
C444	190	100	80
C445	80	56	47
C448	80	47	27
C449	150	150	130
C452	56	34	30
C453	220	220	120
C454	3.9	2.7	2.2
C456	49	34	30
C457	91	62	47
C459	24	24	82
C461	100	100	80
C463	.001	NOT USED	NOT USED
C464	15	30	NOT USED
E401			
E402			
L407			
L408		SEE	
L413	F	DOT NOTE	
R425	1.2k	1.2k	3.9k
R428	39k	47k	39K
R431	33k	33k	22k
R433	56k	47k	47k
R437	100	100	NOT USED
R439	NOT USED	IN THESE ANGES	560

PARTS NOT IDENTIFIED BY VALUE, BUT EACH FREQUENCY RANGE HAS A DIFFERENT CHARACTERISTIC.

R439 NOT USED ON TLB8172A/73, AND TLB8272A/73A. C459 CONNE TO Q408 COLLECTOR.

ss R436.

storized voltmeters (11 megohm) not recommended.

d, voltages measured in respect to chassis ground.

d, capacitor values are in picofarads.

te-Line and PURC paging radios.

control stations.

actory selected so that *Private-Line* deviation falls 00 Hz limits. See parts list for values.

902-5 is not connected to the transmitter interconnect

de inputs are applied via P401-6 or P902-5.

only in flat audio stations.

at audio board is used.

nal Name	With Flat Audio Option Signal Name			
	IDC Limited Flat Audio			
Keyed A+	Flat Audio			
A +	Flat Audio Control			

PARTS LIST SHOWN ON BACK OF THIS DIAGRAM TLB8170A & TLB8270A Series Exciter Schematic Diagram & Circuit Board Detail Motorola No. PEPS-16956-G 10/5/82 - V & G

	PART NO.	DESCRIPTION
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SYMBOL PART NO. DESCRIPTION

PARTS LIST

PARTS LIST

LEGEND

L = 30 - 36 MHz

M = 36 - 42 MHz

TLB8172A/TLB8272A Exciter (30-36 MHz) H = 42 - 50 MHz

TLB8173A/TLB8273A Exciter (36-42 MHz)

TLB8174A/TLB8274A Exciter (42-50 MHz)

Pl₂-5088-1

This parts list covers several models of the low band Exciter Board. Where differences exist a letter suffix L, M, or H is added to the reference symbol or model number given in the

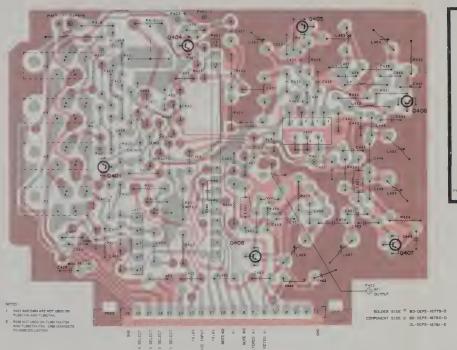
added to the re	ference symbol	e applicable unit.
Description col	umn to snow the	CAPACITOR, fixed: pF ±5%;
		EOO V unless otherwise stated
C401	21-831125	500 V unless otherwise stated 100 ±10%; 300 V
C401	21-82428B59	.01 uF +80-20%; 200 V
C402 C403	21-02920007	NOT USED
C404	8-82905G11	.22uF ±10%; 50 V
C404	21-83596E13	.001 uF ±10%; 100 V
C405	21-82428B59*	.01 uF +80-20%; 200 V
C407, 408	23-84762H08	3.9 uF ±20%; 15 V
C407, 408	21-831125	100 ±10%; 300 V
C411	21-82372C03	0, 1 uF +80-20%; 25 V
C412	21-83596E10	220 ±20%
C413	21-82187B31	.0015 uF ±10%; 100 V
C414	21-831125	100 ±10%; 300 V
C415	21-83596E10	220 ±20%
C416, 417	21-03370230	NOT USED
C418 thru 421	23-84762H08	3.9 uF ±20%; 15 V
C422	21-82372C04	.05 uF +80-20%; 25 V
C423	21-83596E10	220 ±20%
C424, 425, 426	21-82372C04	.05 uF +80-20%; 25 V
C427, 425, 426	21-83406D51	3 ±0.25 pF
C428	21-82133G06	27
C429	Z1-82428B59	.01 uF +80-20%; 200 V
C430L	21-84494B46	180 ±3%
C430M	21-84494B26	130
C430H	21-84494B52	91
C431	21-83406D54	4 ±0,25
C432L	21-84494B18	390
C432M	21-859943	250
C432H	21-84494B09	175
C433L	21-84494B15	300
C433M	21-84494B10	190
C433H	21-84494B51	160
C434, 435	B1-01777011	NOT USED
C436	21-82428B59	.01 uF +80-20%; 200 V
C437	21-83596E13	.001 uF ±10%; 100 V
C438L	21-84494B45	56
C438M	21-84494B24	39
C438H	21-84494B41	24
C439	21-82450B18	2
C440L	21-84494B31	75
C440M	21-84494B44	47
C440H	21-84494B43	36
C441L	21-84494B12	220
C441M	21-84494B46	180 ±3%
C441H	21-84494B35	00
C442, 443	21-82428B59	.01 uF +80-20%; 200 V
C444L	21-84494B10	190
C444M	21-84494B04	100
C444H	21-84494B03	80
C445L	Z1-84494B03	80
C445M	21-84494B45	56
C445H	21-84494B44	47
C446	21-82450B13	1,5
C447	21-83596E13	.001 uF ±10%; 100 V
C448L	21-84494B03	80
C448M	21-84494B44	47
C448H	21-84494B42	27
C449L, M	21-84494B07	150
C449H	21-84494B26	130
C450	21-83596E13	.001 uF ±10%; 100 V
C451	21-82428B50	.01 uF +80-20; Z00 V
C452L	21-84494B45	56
C452M	21-84494B52	3.4
C452H	21-84494B33	50
C453L, M	21-84494B12	220
C453H	21-84494B06	120
C454L	21-82450B03	3.9 ±10°
C454M	21-82450B32	2.7
1 C454H	21-82450B17	1 2, 2

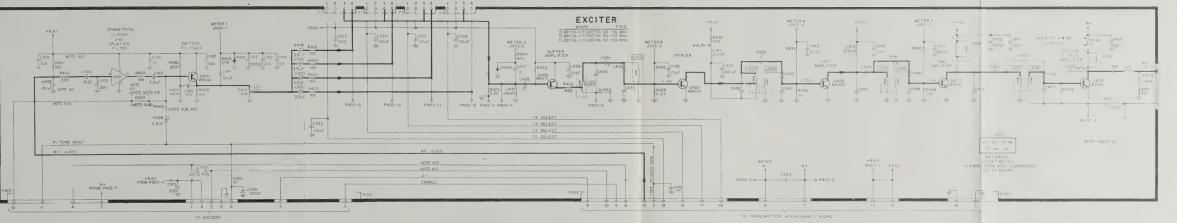
	C457M	21-84494B02	62
- 1	C457H	21-84494B44	47
- {	C458	21-84494B41	NOT USED
	C459L, 459M C459H	21-82610C20	82
H	C460	21-83596E10	220 ±20% (TLB8172A/
- 1	0400	01100170211	TLB8173A/TLB8174A)
	C460	21-83596E13	.001 uF ±10% (TLB8272A/
			TLB8273A/TLB8274A)
- 1	C461L, 461M	21-84494B04	100
	C461H	21-84494B03 21-83596E13	80
	C462 C463L	21-83596E13	.001 uF ±10%; 100 V .001 uF ±10%; 100 V
	C464L	21-840846	15
	C464M	21-849335	30
	C468, 469	21-83596E13	.001 uF ±10% (TLB8272A/
			TLB8273A/TLB8274A)
			DIODE: (SEE NOTE)
	CR401	48-863030	germanium NOT USED
	CR402, 403 CR404	48-82139G01	germanium
	CR404	40-02137001	COIL, rf:
	E401L, M	24-84392B12	40 turns on 330 ohm resistor
	E401H	24-84392B08	18 turns on 220 ohm resistor
	E402L, M	24-84392B11	40 turns on 820 ohm resistor
	E402H	24-84392B12	40 turns on 330 ohm resistor
			CONNECTOR, receptacle:
	J401		NOT USED
	J402	9-84207B01	7 contacts
			COIL rf:
	1.401	24-84389B02	COIL, rf: 18-2/3 turns; coded BLACK
	L402	24-84389B01	18-1/2 turns; coded YELLOW
	L403	24-84389B06	8-2/3 turns; coded GREEN
	L404, 405, 406	24-84389B05	8-1/2 turns; coded RED
	L407L, M	24-84389B07	10-1/2 turns; coded YELLOW
	L407H	24-84389B05	8-1/2 turns; coded RED
	L408L, M	24-84389B07	10-1/2 turns; coded RED
	L408H	24-84389B05	8-1/2 turns; coded RED
	L409	24-80900A61	NOT USED
	L410 L411,412	24-82835G08	0,62 mH 2,6 uH; coded RED-BLUE-
	P411,415	24-02033000	GOLD COULD A SEPTIMENT
	L413L, M	24-84389B10	12-1/3 turns; coded RED
	L413H	24-84389B08	10-1/3 turns; coded BLACK
	}		
			part of printed circuit board
	P401 P402	28-84282D01	phono printed circuit sourd
	P403, 902	20-04202001	part of printed circuit board
	1 400, 702		TRANSISTOR: (SEE NOTE)
	Q401	48-869642	NPN; type M9642
	Q402, 403		NOT USED
	Q404	48-869571	PNP; type M9571
	C405	48-869534 48-869390	NPN; type M9534 NPN; type M9390
	Q406 Q407, 408	48-869591	NPN; type M9591
	2.101, 100		RESISTOR, fixed: ±10%; 1/4 W
			unless otherwise stated
	R401	6-124C43	560
	R402	6-124A37	330 ±5%
	R403	6-124A79	18k ±5%
	R404	6-124A87 or6-124A89	39k Factory Selected 47k For DPL Models
	R405	6-124A85	47k For DPL Models 33k Factory Selected
		or6-124A89	47k _ For Tone PL Models
	R406	6-124A99	120k ±5%
	R407	6-124B04	180k ±5%
	R408	6-124C73	10k
	R409	6-124C83	27k variable: 25k ±30%
	R410 R411thru418	18-83083G24	NOT USED
	R411 thru 422	6-124A79	18k ±5%
	R419 thru 422	6-124C57	2.2k
	R424	6-124C89	47k
	R425L	6-124C51	1.2K
	R425M	6-124C51	1. 2k
	R425H	6-124C63	3.9k
	R426	6-124C47	820 NOT HEED
	R427	6-124C87	NOT USED 39k
	N460L. N	J=167001	

R432 6-124C19 1k R43VL 6-124C31 56k R43VM, H 6-124C31 56k R43VM, H 6-124C31 130 R43VA 6-124C35 15-105K R43VA 1-18076***B2 100 \$5% R43VA 1-18076***B2 100 \$5% R43VA 1-18076***B2 100 \$5% R41VA 1-8076**B2 100 \$5% R41VA 1-8076**B2 100 \$5% R41VA 1-8076**B2 100 \$5% R41VA 1-8076**B3 100 \$5% R41VA 1-8076**B3 100 \$5% R41VA 1-8076**B3 100 \$5% RETAINER; Caused with Q407 \$6 Q408	REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION		
R4311, 6-124C91 59k R434					
R4311, 6-124C91 59k R434	D 422	6 124010	12		
R41M, H 6-124C99 47k R434 6-124C97 13 30 R415 1-80761823 15 410% R4371, M 6-124C25 100 45% R4191 6-124C43 NOT USED SYMMETRICAL CLIPPER AND SPLATTER FILTER: potted unit NON-REFERENCED ITEMS NON-REFERENCED ITEMS 14-86196 INSULATOR, transistor: 2 used (used with Q407 L 26-833*9401) 26-845*8A02 42-824*101) 3-138142 SCREW, tapping: 4-40 x 3/8'; 4-842*401 3-138142 SCREW, tapping: 4-40 x 3/8'; 4-842*401 1-80767848 [29-855*4] 1-80767848 [29-856*4] 1-80767848 [29-					
R434 R415 R416 R419 R419H B-124C25 R418 R419H B-124C25 R419H B-124C25 R419H B-124C43 R419H B-124C43 R419H B-124C43 R419H B-124C43 R419H R419H B-124C43 R419H R419H B-124C43 R419H R419H R419H B-124C43 R419H			47k		
R415 R419H B-124C25 R417L, M B-124C25 R419H B-124C43 R419H R419H R419H B-124C43 R419H R419					
### ##################################	R434	6-124C37	330		
R4371, M 6-124C25 100 s% NOT USED 500 1-80761805 NON-REFERENCED ITEMS 14-861:96 14-861:96 14-861:96 26-833°9H01 26-833°9H01 26-83458A02 42-832+801 3-138162 55-84300001 1-8076988 100 seed of mounting results of mounts of moun	R435	6-124C)5	15 ±10%		
NOT USED So	R436	1-80761-B23			
14-86196 Sommerrical Clipper AND SPLATTER FILTER: Dotted unit 14-86196 NON-REF ERENCED ITEMS 14-86196 INSULATOR, transistor; 2 used (used with Q407 & Q408 26-83379401 26-8359400 3-138162 SIRELD, coll: 8 used 42-8324-801 4EAT SINK: 2 used SFEED STREET	R437L, M	6-124C25	100 ±5%		
SYMMETRICAL CLIPPER			NOT USED		
V401	R439H	439H 6~124C43 560			
1-80761805 potted unit					
NON-REFERENCED ITEMS 14-861296 INSULATOR, transistor; 2 used (used with Q407 to Q405) 26-83379401 26-8548020 24-828-8401 3-138162 SIRELD, coll. 8 used REFAINER, screw, 4 used (SCREW, tapping: 4-40 x 3/8"; 4 used (used for mounting retainers) 1-80767186 CHARLES 29-885641 29-885641 29-84028401 19 used 29-84028401 29-84					
14-861796 INSULATOR, transistor: 2 used (used with Q407 & Q408) 26-835*9401 HEAT SINK: 2 used 26-835*4020 4 HEAT SINK: 2 used 3-13816; 2 4 40 × 3/8"; 4	U401	1-80763B05	potted unit		
2 used (used with Q407 & Q408) 26-8359401 26-8459402 42-8424-8001 3-138162 3-138162 1-8075098 1-	NON-REFERENCED ITEMS				
2 used (used with Q407 & Q408) 26-8359401 26-8459402 42-8424-8001 3-138162 3-138162 1-8075098 1-		14.0(100)	THORN LEGEL		
C408) 26-833°9401 26-83458A02 42-8324-801 3-138162 55-84300001 1-8076788 29-855*43 29-84028401 29-84028401 29-84028402 29-84028401 29-84028402 29-840		14-801290			
26-83393401 26-8459802 42-8424-801 3-138162 57-8430801 1-8076788 29-85543 29-85043 29-84028002 29-8402					
26-845/8-0.02 SHIELD, coll; 8 used 42-8428-1001 3-138162 SCREW, tapping: 4-40 x 3/8"; 4-50 x 3/8"; 4-50 x 3/8"; 4-50 x 3/8"; 55-84300.001 1-8076/948 [29-8554] PIN, terminal: .800" lg; 15 used 29-840/8401 PIN, terminal: .800" lg; 15 used 29-840/8402 PIN, terminal: .595" lg; 12 used 1-8079/389; 0-55"; 10 used 1-8079/389; 0-5878/500 CABLE, CASEMBLY includes: CABLE, CANAILE ROWN lg; 15 used 1-8079/389; 0-5878/500 CABLE, CANAILE ROWN lg; 15 used 15 us		26 922701/01			
42-8424-8001 3-138142 3-138142 5-8430-8001 1-807-678-8 1-807-678-8 1-807-678-8 29-855-83 629-8028901 29-84028901 29-84028902 2					
3-138142 SCREW, tapping: 4-40 x 3/8"; 4 used (used for mounting retainers) 1-80767848 29-85543 29-85543 29-84028401 29-84028401 29-84028402 29-8402840					
4 used (used for mounting retainers) 55-84300801 1-80767948 29-85543 PN, terminal: .385" lg: 16 used 29-84028H01 29-84028H02 29-84028H02 29-84028H02 29-84028H02 29-84029H02 2					
Technology February Februar	3-130102				
55.843-0001 HANDLE CIRCUIT BOARD ASSEMBLY includes: 29-855*43 PN, terminal: .385" lg: 16 used 29-84028H01 PN, terminal: .800" lg: 19 used 39-10184A10 CONTACT, male: .058 x 1-80793Bs9 CABLE ASSEMBLY includes: CABLE, coaxial: 8" lg.					
uncludes; 29-84028H01 29-84028H01 39-8028H02 29-84028H02 29-84028H02 39-10184A10 39-10184A10 1-80793Bs9 CABLE_CASEMBLY includes: CABLE_CANAIL® its.		55-84300B01			
29-855-43 PN, terminal: .385" g: l6 used 29-84028H01 PN, terminal: .300" g: 19 used 29-84028H02 PN, terminal: .595" g: 12 used 29-84028H02 CNTACT, male: .058 x 355"; 10 used 1-80793589 CABLE_ASSEMBLY includes: CABLE_CANAIL 8" g.		1-80767B48			
16 used 29-84028H01 PIN, terminal: .800" kg.: 19 used 29-84028H02 PIN, terminal: .595" kg.: 12 used 39-10184A10 State Communication of the communication of					
29-84028H01 PIN, terminal: 800" ig.; 19 used 29-84028H02 PIN, terminal: 595" ig.; 12 used 39-10184410 CONTACT, male: .058 x 355"; 10 used 1-80793589 CABLE_ASSEMBLY includes: CABLE_CANIAL: 8" ig.		29-855943			
19 used 29-84028H02 PIN, terminal: .595" lg.; l2 used 39-1018+A10 CONTACT, male: .058 x .355"; l0 used 1-807918-9 CABLE ASSEMBLY includes: CABLE, coaxial: 8" lg.					
29-84028H02 PIN, terminal: .595" lg.; l2 used CONTACT, mule: .058 x .355"; l0 used l-8079389 CABLE ASSEMBLY includes: CABLE, coaxial: 8" lg.		29-84028H01			
12 used 39-10184A10 CONTACT, male: .058 x .355": 10 used 1-80793B69 CABLE ASSEMBLY includes: 30-83791COL CABLE, coaxial: 8" lg.					
39-10184A10 CONTACT, male: .058 x .355"; 10 used 1-80793B69 CABLE ASSEMBLY includes: 30-83794C01 CABLE, coaxial: 8" lg.		29-84028H02			
.355"; 10 used 1-80793B69 CABLE ASSEMBLY includes: 30-83794C01 CABLE, coaxial: 8" lg.					
30-83794C01 CABLE, coaxial: 8" lg.	39-10184A10				
		1-80793B69			
		30-83794C01	CABLE, coaxial: 8" lg.		

For optimum performance, replacement diodes and transistors must be ordered by Motorola part numbers.

	REVISIONS PEPS-16956-E		
CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
LB8172A-1 LB8173A-1 LB8174A-1	R425	WAS 6-124C51, 1.2K	PARTS LIST
LB8272A LB8273A LB8274A		NEW MODELS ADDED	
LB8174A-3 LB8274A-1	C440H	FROM 21-84494B33. 30 pF TO 21-84494B43, 36 pF	
	C481H	FROM 21-84494B27, 140 pF TO 21-84494B35, 60 pF	





C433 300 190 160 C438 56 39 24 C440 75 47 36 001 NOT USED NOT USED
15 30 NOT USED R425 1.2k 1.2k 3.9k R433 36K 47K 47K R437 100 100 NOT USED
R439 NOT USED IN THESE 560
TWO MANGES

COMPONENT VALUE TABLE AFFECTED 30-36 36-42 42-50

C430 180 130 91 JAN 394 % NO.

PARTS NOT IDENTIFIED BY VALUE BUT EACH FREQUENCY RANGE HAS A DIFFERENT CHARACTERISTIC

401 Transmitter Frequency Calculation

tc = 3to

Where
fo = Channel Element Frequency
fc = Carrier Frequency 402 Voltage measured across R436

403 High impedance translatorized voltmeters (11 megohm) not recommended

404. Unless otherwise stated voltages measured in respect to chassis ground

405 Unless otherwise stated capacitor values are in picofarads

406. JU401 removed in Privil 'e-Line and PURC paging radios

407 R401 removed in remote control stations

408 R404 and R405 are factory selected so that Private Line deviation falls between 500 Hz and 1000 Hz limits. See parts list for values.

409 In Private-Line radios, P902-5 is not connected to the transmitter interconnect

410 Remove R405 unless acde inputs are applied via P401-6 or P902-5

411 R402 and R403 removes only in flat audio stations.

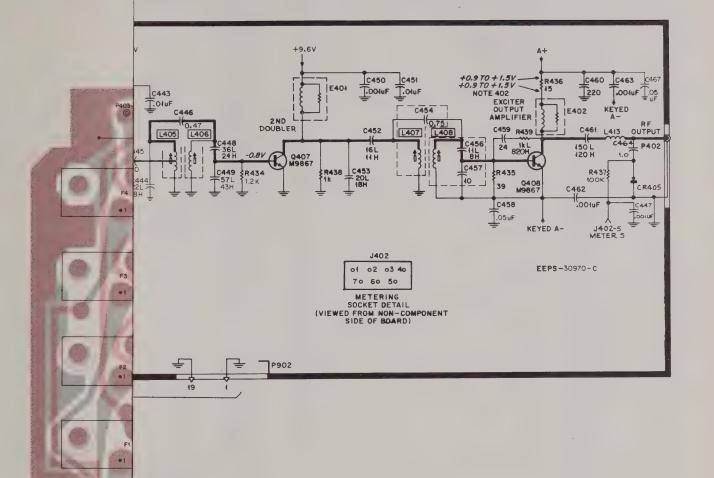
412 JU402 is added when flat audio board is used.

413. With PL Squeich Signal Name With Flat Audio Option Signal Name P401-10 Code Input IDC Limited Flat Audio P401-4, 902 8 Delayed Keyed A + Flat Audio

P401-2, 902-10 Keyed A + Flat Audio Control

PARTS LIST SHOWN ON BACK OF THIS DIAGRAM TLB8170A & TLB8270A Series Exciter Schematic Diagram & Circuit Board Detail Motorola No. PEPS-16956-G 10/5/82 - V & G

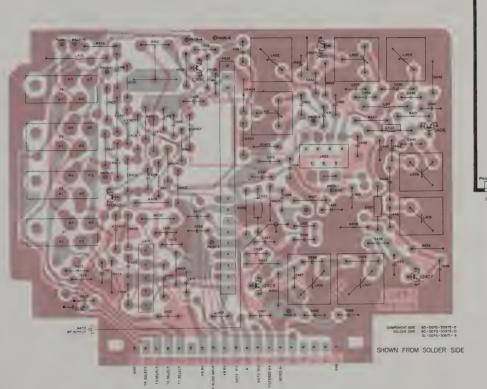


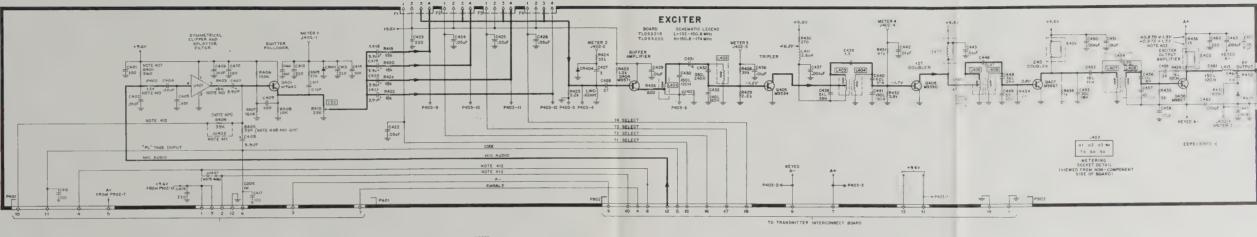


PREVIOUS REVISIONS AND PARTS LIST SHOWN ON BACK OF THIS DIAGRAM TLD5321B and TLD5322B Exciters Schematic Diagram and Circuit Board Detail Motorola No. PEPS-30974-B

5/12/82 - V & G







NOTES

401 Transmitter Frequency Calculation.

Where
fo = Channel Element Frequency
fc = Carrier Frequency

402 Voltage measured across R436

403 High impedance transistorized voltmeters (11 megohm) not recommended

404 Unless otherwise stated, voltages measured in respect to chassis ground

405 Unless otherwise stated, capacitor values are in picolarads

406. JU401 removed in Private-Line and PURC paging radios

407 R401 removed in remote control stations

408. R405 is removed unless code inputs are applied via P401-6 or P902-5

409. R404 and R405 are factory selected so that Private-Line deviation falls between 500 Hz and 1000 Hz limits

410 R402 and R403 removed only in flat audio stations.

411 JU402 is added when flat audio board is used

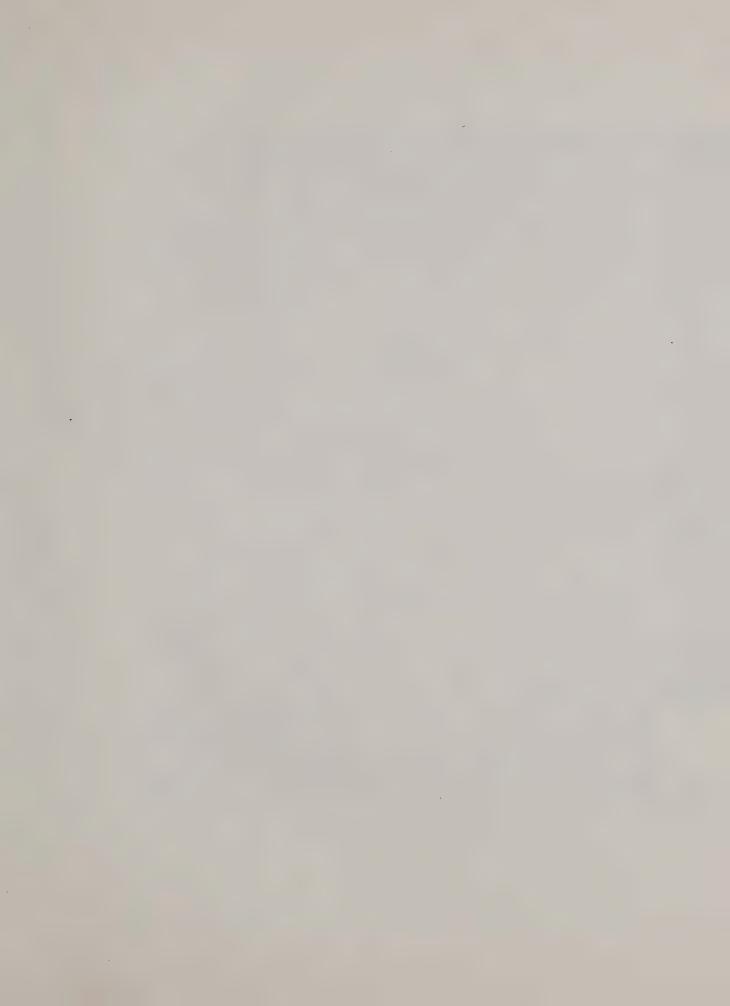
412. With PL Squelch Signal Name With Flat Audio Option Signal Name P401-10 Code Input IDC Limited Flat Audio

P401-4, 902-8 Delayed Keyed A + Flat Audio

P401-2, 902-10 Keyed A + Flat Audio Control

PREVIOUS REVISIONS AND PARTS LIST & SHOWN ON BACK OF THIS DIAGRAM TLD5321B and TLD5322B Exciters Schematic Diagram and Circuit Board Detail Motorola No. PEPS-30974-B 5/12/82 - V & G





parts list

TLD5321B Exciter (132-150.8 MHz) = L

TLD53228 Exciter	(150.8-174 MHz) = H	PL-1		
REFERENCE	MOTOROLA		П	
SYMBOL	PART NO.	DESCRIPTION		

Miles .	marke He		Street,	models of	Albert Steam	h boad	Evertor I	Daned	UMb o	o diffe	
toive	a latter	gufffy (Or 5	is added	to the r	oforanc	re evmbr	al to at	DW 1	ho anni	Icable
		Julia C					o oymoo			по аррі	

CAD1 CAD2 CAD2 CAD3 CAD4 CAD4 CAD5 CAD5 CAD5 CAD6 CAD6 CAD6 CAD7 CAD7 CAD7 CAD7 CAD7 CAD7 CAD7 CAD7	This parts list cov exist a letter suffi unit.	ers two models of ix L or H is added	the high band Exciter Board. Where of to the reference symbol to show the
CA01 2 + 8-3125 100 ± 101/4, 300 V - 0.7			capacitor, fixed: pF ± 5%; 500 V
C403	0404	04 004405	unless otherwise stated
C403 C406 C406 C407 C406 C407 C406 C407 C406 C407 C406 C407 C407 C406 C407 C407 C407 C407 C407 C407 C407 C407	C401	21-031125 21-83606E21	01 uE + 80.20% - 200 V
C406		21-03000021	
CAMP		8-82905G11	.22 uF ± 10%; 50 V
CAMP	C405	21-83596E13	.001 uF ± 10%; 100 V
CAMPA 10	C406	21-83596E21	.01 uF +80-20%; 200 V
C411 4.14 7.1 4.14 2.14 2.14 2.14 2.14 2.14 2.14 2.	C407, 408		3.9 uF ± 20%; 15 V
C414, 415, 417, 417, 418, 418, 418, 418, 418, 418, 418, 418	C409, 410	21-831125	100 ± 10%; 300 V
C458		21-82372003	0.1 UF + 80-20%; 25 V
C458	C412, 413, 413		100 ± 10% · 300 V
C458	C418 thru 421		3 9 uF + 20% 15 V
C458	C422		.05 uF + 80-20%, 25 V
C458	C423	21-83596E10	220 ± 10%
C458	C424, 425, 426	21-82872C10	.05 uF + 80-20%; 25 V
CASOL 21-84494807 150 CASOL 21-8449807 150 CASOL 21-84498080 150 C			
CASOL 21-84494807 150 CASOL 21-8449807 150 CASOL 21-84498080 150 C	C428	21-83406D68	27; 500 V
C4301 21-8449806 120 C43124 21-8449806 120 C43242	C429	21-83596E21	.01 uF + 80-20%; 200 v
CA31 21-83-980054 4 ± 0.25 pF CA321 21-84-984813 300 CA321 21-84-984813 240 CA321 21-84-984810 150 CA441 21-84-98810 150 CA451 21-83-98610 150 CA4		21-04494007 21-84404B08	120
C4321. 21-84-948-916 330 C4334 42 21-84-948-916 100 2 31/6 C4334 43 21-84-948-916 100 2 31/6 C4334 43 21-84-948-916 100 2 31/6 C4361 21-84-948-916 100 2 31/6 C4361 21-84-948-916 100 2 31/6 C4361 21-84-948-916 100 2 31/6 C4461 21-84-948-916 100 3 39/6 C4561 21-84-948-916 100 3 39		21.83406054	4 + 0.25 nF
C4331 21-84494843 240 25% C438 21-83596E3 15 13 25% C438 21-83596E3 15 13 13 14 15% C438 12-83596E3 15 13 15 15% C438 12-83596E3 15 15 15% C438 12-83596E3 15 15 15% C438 12-83596E3 15 15 15% C439 12-83596E3 15 15 15% C449 12-83596E3 15 15 15% C449 12-83596E3 15 15 15% C441 12-83596E3 15 15 15% C441 12-83596E3 15 15% C448 12-83596E3 15 15% C448 12-83596E3 15% C448 12-83596E3 15% C448 12-83596E3 15% C448 12-83596E3 15% C459 12-83596E3 15% C459 12-83596E3 15% C459 12-83596E3 15% C450		21-84494B16	330
C4331 21-84494843 240 25% C438 21-83596E3 15 13 25% C438 21-83596E3 15 13 13 14 15% C438 12-83596E3 15 13 15 15% C438 12-83596E3 15 15 15% C438 12-83596E3 15 15 15% C438 12-83596E3 15 15 15% C439 12-83596E3 15 15 15% C449 12-83596E3 15 15 15% C449 12-83596E3 15 15 15% C441 12-83596E3 15 15 15% C441 12-83596E3 15 15% C448 12-83596E3 15 15% C448 12-83596E3 15% C448 12-83596E3 15% C448 12-83596E3 15% C448 12-83596E3 15% C459 12-83596E3 15% C459 12-83596E3 15% C459 12-83596E3 15% C450	C432H	21-84494B13	
C434, 435 C438 C438 C438 C438 C438 C438 C438 C438	C433L	21-84494B13	240
C436 21-83596E31 0.01 uF = 100%; 100 V 0.01 uF = 100%; 100 UF = 100%; 100 V 0.01 uF = 10		21-84494B46	180 ± 3%
CASBIL 21-8-44948301 51 5 ± 10% CASBIL 21-8-44948301 51 5 ± 10% CASBIL 21-8-44948322 15 ± 10% CASBIL 21-8-44948322 15 ± 10% CASBIL 21-8-44948324 15 ± 10% CASBIL 21-8-44948324 17 5 ± 10% CASBIL 21-8-44948324 17 180 0 10 10 10 10 10 10 10 10 10 10 10 10	C434, 435		NOTUSED
CASBIL 21-8-44948301 51 5 ± 10% CASBIL 21-8-44948301 51 5 ± 10% CASBIL 21-8-44948322 15 ± 10% CASBIL 21-8-44948322 15 ± 10% CASBIL 21-8-44948324 15 ± 10% CASBIL 21-8-44948324 17 5 ± 10% CASBIL 21-8-44948324 17 180 0 10 10 10 10 10 10 10 10 10 10 10 10	C436	21-83596E21	.01 uF + 80-20%; 200 V
CA39H	C437		.001 uP ± 10%; 100 V
CA490 21-881453 1.5 ± 10% 62 CA401L 21-881453 1.5 ± 10% 62 CA401L 21-8814510 190 CA411 21-8814610 190 CA411 21-8814610 190 CA412 21-881601 190 CA412 21-881601 190 CA42 21-881601 190 CA42 21-881601 190 CA43 21-881601 190 CA44 21-881601 190 CA48 21-881601 190			
CA40L 21-852322 62 CA40H 21-8563232 62 CA40H 21-8563232 62 CA40H 21-856501 130 CA41H 21-86501 130 CA41H 21-86501 130 CA41H 21-86501 130 CA42, 443 21-85450837 470 ±10% CA46 21-85450837 0,47 10% CA46 21-85450837 0,47 10 ±10%; 100 V CA46 21-85450838 0,47 10 ±10%; 100 V CA46 21-85450838 0,47 10 ±10%; 100 V CA47 21-85450838 0,47 10 ±10%; 100 V CA45 21-85450838 0,47 10 ±10%; 100 V CA46 21-85450838 0,47 10 ±10%; 100 V CA47 21-85450838 0,47 10 ±10%; 100 V CA48 21-8545083	C43011	21,861453	
C440 21-88688 47	C440L	21-852322	62
C4411	C440H	21-868681	47
C444, 443 21-83596621	C441L	21-84494B10	190
C444L 21-84493856 22 C444B 21-83406035 22 C448B 21-83406037 0.47 10.0 v	C441H	21-861601	130
C444H	C442, 443	21-83596E21	.01 uF +80-20%; 200 V
C446 2 1-82187845 470 ± 10% C448H 2 1-83406092 36 C459 2	C444L		
C448, 1 21-83496B93 36 C448, 1 21-83496B93 37 C448, 1 21-83496B93 37 C448, 1 21-83496B93 37 C450, 1 21-83496B93 37 C50, 1 21-83496B93	C446H	21-03400000	
C448, 1 21-83496B93 36 C448, 1 21-83496B93 37 C448, 1 21-83496B93 37 C448, 1 21-83496B93 37 C450, 1 21-83496B93 37 C50, 1 21-83496B93	C446	21-02107045 21-82450R37	0.47
C448L 21-83400592 36 C448H 21-83400593 37 C481 21-83408293 43 C482 43-83408293 43 C483 21-83408293 20 C483 21-83408293 20 C484 21-83408293 20 C485 21-83408293 20 C487 21-83408293 21 C487 21-83408293 21 C488 21-83408293 21 C489 21-83408293 21 C489 21-83408293 21 C480 21-83408293 21 C480 21-83408293 21 C480 21-83408293 21 C481 21-83408293 21 C481 21-83408293 21 C482 483 21-83408293 21 C484 21-83408293 21 C485 21-83408293 21 C486 21-83408293 21 C487 21-83408293 21 C488 21-83408293 21 C489 21-83408293 21 C480 21-83408293 21 C480 21-83408293 21 C480 21-83408293 21 C481 21-83408293 21 C482 43-83408393 21 C484 21-83408293 21 C4	C447	21-83596E13	.001 uF ± 10%; 100 V
C449L 21-84498283 57; 200 V C4891 21-84494828 57 C4891 21-859629 21 C4891 21-859629 21	C448L	21-83406D92	36
CA49H		21-83406056	
C480 21-83596E13 .001 UF ± 80/239/1; 200 V C481 12 -12-83596E13 .001 UF ± 80/239/1; 200 V C482 UF 21-83496D10 11 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			57; 200 V
C451 21-8359621 07 F 89-20%; 200 V 6-20%; 20			43
C4521 21-83406083 16 C4521 21-83406083 16 C4531 21-83406085 18 C4531 21-83406085 18 C453 21-83406085 18 C453 21-83406080 175 2100% C453 21-83406080 18 C453 21-83406080 18 2.0 5 pF C457 21-83406089 10 2.0 5 pF C457 21-83406089 10 2.0 5 pF C458 21-8340608 10 2.0 pF C458 21-8340608 10 2.0 pF C458 21-8340608 10 2.0 pF C458 21-836068 10 2.0 pF C458 21-8350682 10 2.0 pF C458 21-8350682 10 2.0 pF C469 21-8350682 10 2.0 pF C460 21-8350682 10 2.0 p	C450	21-83596E13	.001 UF ± 10%; 100 V
C43214 21-83406090 11 C43514 21-83406090 11 C43514 21-83406090 12 C43514 21-83406090 0.75 ± 10% NOT USED 1 1 ± 0.5 pF 1 ± 0.4506000 11 1 ± 0.5 pF 1 ± 0.5	C451		16
C453L 21-83406081 20 C453 21-82450666 3775 ± 1019, C456 21-82450666 3175 ± 1019, C456 12-834060070 11 5 ± 0.5 pF 10-455 12-834060070 11 5 ± 0.5 pF 10-455 12-83406008 21 10 ± 0.5 pF 10-455 12-83406008 21 10 ± 0.5 pF 10-455 12-83406085 24; NPO C460 21-8359661 20 20 ± 2019, C460 21-8359661 20 0.01 uF ± 1019; 100 V C461 12-83459681 20 0.01 uF ± 1019; 100 V C461 21-82578610 10 0.01 uF ± 1019; 100 V C462 42 12-8259682 10 0.01 uF ± 1019; 100 V C463 21-82578682 10 0.01 uF ± 1019; 100 V C464 21-82578682 10 0.01 uF ± 1019; 100 V C465 21-82578682 10 0.01 uF ± 1019; 100 V C467 21-8		21-83406D90	
C453H 2*8-3490055 18 075 = 1197 0		21-83406D81	20
C455 21-83406000 19 1 0.5 pF 1 0.5 pF	C453H	21-83406D55	18
C456L 21-834067090 11 3 a5 pr 6 C456H 21-83406707 3 11 3 a5 pr 6 C456H 21-83406707 3 11 3 a5 pr 6 C456 21-834757010 05 12 3 a5 pr 6 C450 21-8349681 07 20 5 20 5 20 5 20 5 20 5 20 5 20 5 2	C454	21-82450B06	0.75 ± 10%
C456H 21-83406D70 8 ± 0.5 pF 10 ± 0.5 pF 1			NOT USED
C488 21-82372C10			11
C488 21-82372C10			8 ± 0.5 pr
C499 21-840365 224, NPO 20 20 20 20 20 20 20 20 20 20 20 20 20			05 ± 20% - 25 V
C460 21-83596E10 220 ± 2014 C46114 21-84494805 100 124 ± 109; 100 V C461143 21-84494805 100 124 ± 109; 100 V C461444 21 ± 20355882 1.0 C465 21-82187805 580 00 ± 200 V; 25 V C466 21-82187805 580 00 ± 200 V; 25 V C467 21-82372C10 0.05 ± 200 V; 25 V C460 21-82480500 00 ± 200 V; 25 V C460 24-8459200	C459	21-840365	24: NP0
C4911 21-8449807 150 100 V (24914 100 V (249	C460	21-83596E10	220 ± 20%
C442, 463 21-83596E13 .001 UF ± 10%;100 V 1 C446 21-82156B2 .001 UF ± 10%;100 V 1 C467 21-8217620 .005 500 CR402, 403 .005 48-82139601 .005 20%;25 V .005 20	C461L	21-84494807	150
C484 21-82356882 1.0 NOTUSED 0.0 C485 21-82356882 1.0 NOTUSED 0.0 Sea 2014; 25 V didod: (see note) permanlum 2.0 c18402, 403 48-82139001 2.0 c18404, 405 48-82139001 2.0 c18404, 405 48-82139001 2.0 c18404, 405 48-82382865 2.0 c18404 2.2 c18403282865 2.0 c18404 2.2 c18403288802 2.0 c18404 2.2 c1840388802 2.0 c18404 2.0 c1	C461H	21-84494B06	120
C465 C.466 21-82187806 50 20 20 20 20 20 20 20 20 20 20 20 20 20	C462, 463		
C466 21-82187806 500 5-20 W; 25 V CR401 48-863030 didde: (see acte) germanium NOT USED		21-82355B62	
CR401 21-82372C10 0.05 ± 20%; 25 V diolor; (see note) germanium NOT USED Germanium NOT US		04.00403000	NOTUSED
CR401	C466	21-82187800	05 ± 20%-25 V
CR401	C407	21-02372010	.05 1. 20 10, 25 4
CR401			
CR402, 403 CR404, 405 EA01	CR401	48-863030	germanium
CR404, 405 48-82198061 E401 24-84392806 E4021 24-84392805 E40214 24-84392805 E4034 24-84392805 E4034 24-84392806 E4034 24-84392806 E4034 24-84392806 E4034 24-84392806 E4034 24-84392806 E4034 24-84392806 E4034 24-8439806 E4034 E4	CR402, 403		NOT USED
E401 24-84/392866 40 turns on 820 phm realistor e4022, 24-84/392813 15 turns on 580 phm realistor e4022, 24-84/392813 15 turns on 580 phm realistor e4024 24-84/392815 15 turns on 580 phm realistor e4024 24-828/3928 27 turns of 680 phm realistor e4024 27 turns of 680 phm	CR404, 405	48-82139G01	germanlum
E401 24-84/392866 40 turns on 820 phm realistor e4022, 24-84/392813 15 turns on 580 phm realistor e4022, 24-84/392813 15 turns on 580 phm realistor e4024 24-84/392815 15 turns on 580 phm realistor e4024 24-828/3928 27 turns of 680 phm realistor e4024 27 turns of 680 phm			
E402L 24-84392813 15 turns on 560 ohm resistor e4022 42-84392805 12 turns on 560 ohm resistor e403L 24-84392805 12 turns on 560 ohm resistor e403L 24-84392813 12 turns on 104 ohm resistor e403H 22 2-14 oh code 670-8 LU-GLD Omnetots of turns of tu	E104	04.04202000	40 turns on 920 ohm resistor
E4024 24-8439805 9 turns on 580 chm relation e4031. 24-84392018 27 of voter e104. D 1401 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		24-04392000	15 turns on 560 ohm resistor
E403.L 24-843920218 40 turns on 10k ohm resistor E403H 24-82835008 27 v1 hordooff E70-BLU-GLD J401 3402 9-84207801 7 contector receptacle: NOT USED J402 9-84207801 7 contector receptacle: NOT USED 1401 24-8438800 e10.Hrt coded BLK 1402 24-8438800 820 820 turns coded GRN 8-24-8438805 820 turns coded GRN 8-24-8438805 820 turns coded RB N		24-84392B05	9 turns on 560 ohm resistor
E403H 24-82835G08 2.7 u H coded RED-BLLFGLD J401 J402 9-84207B01 7 connector, receptacle: NOT USED Coll, rt. L401 24-8438B02 15-02		24-84392G18	40 turns on 10k ohm resistor
1,401 connectic receptacle: NOTUSED 1,402 9-84,207801 7 contects Coll. rt. 1,401 24-84,389802 18-20 turns; coded BLK 1,402 24-84,389805 18-20 turns; coded VEL 1,404 24-84,389805 8-21 turns; coded RED			2.7 uH coded RED-BLU-GLD
J402 9-8427801 7 contacts sbi, rt sbi			
J402 9-8427801 7 contacts sbi, rt sbi			connector, receptacle:
coll, rf: L401 24-84398902 18-2/3 turns; coded BLK L402 24-84398901 18-1/2 turns; coded YEL L403 24-84398906 8-2/3 turns; coded GRN L404 24-84398905 8-1/2 turns; coded GRN	J401	0.04007004	NOTUSED
L401 24-84389B02 18-2/3 turns; coded BLK L402 24-84389B01 18-1/2 turns; coded YEL L403 24-84389B06 8-2/3 turns; coded GRN L404 24-84389B05 8-1/2 turns; coded RED	J402	8-04207801	7 contacts
L401 24-84389B02 18-2/3 turns; coded BLK L402 24-84389B01 18-1/2 turns; coded YEL L403 24-84389B06 8-2/3 turns; coded GRN L404 24-84389B05 8-1/2 turns; coded RED			coll. rf:
L402 24-84389B01 18-1/2 turns; coded YEL L403 24-84389B06 8-2/3 turns; coded GRN L404 24-84389B05 8-1/2 turns; coded RED	1.401	24-84389802	
L403 24-84389B06 8-2/3 turns; coded GRN L404 24-84389B05 8-1/2 turns; coded RED	L402	24-84389B01	
L404 24-84389B05 8-1/2 turns; coded RED	L403	24-84389B06	8-2/3 turns: coded GRN
L405 24-84972A33 6-1/2 turns; coded RED	L404	24-84389B05	8-1/2 turns; coded RED
	L405	24-84972A33	6-1/2 turns; coded RED

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
L406	24-84972A09	6-1/2 turns; coded YEL
L407, 408	24-84972A11	3-1/2 turns; coded GRN
L409		NOTUSED
L410	24-80900A61	0.62 mH
L411	24-82835G08	2.6 uH; coded RED-BLU-GLD
L412		NOT USED
L413H	24-84923C01	1-1/2 turns
L413L	24-84923C04	2-1/2 turns
P401		connector, plug:
P402	28-84282D01	part of printed circuit board phono
P403, 902	20-04202001	part of printed circuit board
		transistor: (see note)
Q401 Q402, 403	48-869642	NPN; type M9642 NOT USED
Q404	48-869571	PNP; type M9571
Q405	48-869534	NPN; type M9534
Q405 Q406	48-869390	NPN, type M9390
Q407, 408	48-869867	NPN; type M9867
		resistor, fixed: ±5%; 1/4 W
		unless otherwise stated
R401	6-124A43	560
R402	6-124A53	1.5k
R403	6-124A79	18k
R404	6-124A87 or	39k
	6-124A89	47k (factory selected for DPL models only)
R405	6-124A85 or	33k
	6-124A89	47k (factory selected for PL models only)
R406	6-124A99	120k
R407	6-124B04	180k
R408	6-124A73	10k
R409	6-124A83	27k
R410	18-83083G24	variable: 25k ± 30%
R411 thru 418		NOT USED
B419	6-124A79	18k%
R423	6-124A57	2.2k
R424	6-124A85	33k
R425	6-124A51	1,2k
B426	6-124A47	820
R427		NOTUSED
R428	6-124A87	39k
R429	6-124A57	2.2k
R430	6-124A35	270
R431	6-124A89	47k
R432	8-124A63	3.9k
R433		NOT USED
R434	6-124A51	1,2k
R435	6-124A15	39
R436	6-125C05	15 ± 10%; 1/2 W
R437	6-124A97	100k
R438	6-124A49	1k
R439L	6-124A49	1k
R439H	6-124A47	820
		symmetrical clipper and splatter filter:
U401	1-80726D74	potted unit
	14-861196	referenced items
		INSULATOR, transistor; 2 req'd. (used wit Q407 & Q408)
	26-83379H01	HEAT SINK (used with Q408)
	26-84598A01	SHIELD, coll; 2 req'd (used with L405, L406
	26-84598A02	SHIELD, coll; 4 req'd. (used with L401 thr L404)
	26-84250B14	SHIELD, coil, 2 re'd, (used with L407, L408)
	42-84284B01	RETAINER: 4 req'd.
	3-139506	HEX LOCK, 4-40 x 5/8"; 4 req'd. (used for mounting Retainers)
	55-84300B01	HANDLE
	30-83794C01	CABLE, coaxial; 6" req'd. (used with P402)
	29-84028H01	TERMINAL, pin; 19 req'd.
	29-84028H02	TERMINAL, pin; 12 reg'd.
	29-84028H02 29-855943 39-10184A10	TERMINAL, pin; 12 req'd. TERMINAL, pin; 16 req'd. CONTACT, terminal, 10 req'd.

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.





EXCITER/1ST BANDPASS FILTER

MODEL TLE1720B SERIES

TRIPLER/LOW LEVEL AMPLIFIER

MODEL TLE1600B SERIES

REFERENCE SYMBOL

MOTOR

PARTS LIST

TLD5491A, AV Exciter (1 TLD5492A, AV Exciter (1 This parts list covers tv

Motorola No. PEPS-18716-H (Sheet 1 of 2) 10/5/82 - V & G

EXCITER/1ST BANDPASS FILTER

MODEL TLE1720B SERIES

TRIPLER/LOW LEVEL AMPLIFIER

MODEL TLE1600B SERIES

NOTES: 414. THE T REPAIR THIS FILTE 415. APPLII AMPLI 413 100 11 4

- 414. THE TRIPLER/LOW LEVEL AMPLIFIER "BOX" IS NOT REPAIRABLE. IF DEFECTIVE, IT MUST BE REPLACED. THIS ALSO APPLIES TO THE 1ST AND ZND BANDPASS FILTERS.
- APPLIED TO THE FOLLOWING PA STAGE (OR DRIVER AMPLIFIER OF THE 884RCB MODEL SERIES).

CEPS-17178-C

FUNCTION

Exciter — Produces modulated RF signal in 135-171 MHz range.

1st Bandpass Filter — Attenuates signals outside the bandpass range.

Tripler/Low Level Amp. — Triples exciter output frequency and amplifies that signal to drive the following PA.

2nd Bandpass Filter
Note 410

A TFE6153A TFE6154A TFE6155A

X

X

Motorola No. PEPS-18716-H (Sheet 2 of 2) 10/5/82 - V & G

EXCITER/1ST BANDPASS FILTER

MODEL TLE1720B SERIES

TRIPLER/LOW LEVEL AMPLIFIER

MODEL TLE1600B SERIES

Motorola No. PEPS-18716-H

(Sheet 1 of 2) 10/5/82 - V & G

REFERENCE MOTOROLA SYMBOL PART NO DESCRIPTION	REFERENCE SYMBOL	MOTOROLA PART NO
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PARTS LIST LEGEND

L = 132-150.8 MH2
H = 150.8-174 MHz

TL D5491A, AV Exciter (132-150.8 MHz)
TLD5492A, AV Exciter (150.8-174 MHz)
This parts list covers two models of the high band Exciter

ard. Wher	e differences ex	cist a letter suffix L or H is l to show the applicable unit.
		CAPACITOR, fixed: pF ±5%;
		500 V: unless otherwise states
1	21-831125	
12	21-82428B59	.01 uF +80-20%; 200 V
3		
14	8-82905G11	, 22 uF ±10%; 50 V ,001 uF ±10%; 100 V .01 uF +80-20%; 200 V 3.9 uF ±20%; 15 V 100 ±10%; 300 V
15	21-83596E13	.001 uF ±10%; 100 V
17, 408	21-82428B62	.01 uF +80-20%; 200 V
19, 410	21 92112E	3.9 uF ±20%; 15 V
1	21-82372003	100 ±10%; 300 V
2, 413	21-83596 E10	0.1 uF +80-20%; 25 V 220 ±20%
4	21-831125	1100 ±10%: 300 V
5	21-83596E10	
6, 717		
8 thru 421	23-84762H08	3.9 uF ±20%; 15 V .05 uF +80-20%; 25 V 220 ±20%
. 2	21-82372C04	.05 uF +80-20%; 25 V
13	21-83596E10	220 ±20%
4, 425, 426	21-82372C04	3 ±0.25 pF 27; 500 V .01 uF +80-20%; 200 V
18	21-83406D51	3 ±0.25 pF
:0 !9	21 92429762	27; 500 V
	21-84494B07	150 ur +80-20%; 200 V
OH	21 04404004	120
1	21-8340°D54 21-84494B16 21-84494B13	4 ±0.25 pF
	21-84494B16	330
2H	21-84494B13	240
3L	21-84494B13 21-84494B46 21-84494B46	240
3H	Z1-84494B46	180 ±3%
4, 435		
7	21-82428B62	.01 uF +80-20%; 200 V .001 uF ±10%; 100 V
8L	21-83590E13	.001 uF ±10%; 100 V
8H	21-04474801	30
91-	21-84494B24 21-861453 21-864518 21-852322	1.5 +10%
9H	21-864518	1 ±10%
0 L	21-852322 21-868681	62
0H	21-868681	47
1L	21-84494B10	190
IH	21-861601	130 ±3%
2, 443	21-82428B59	.01 uF +80-20%; 200 V
4L 4H	21-84493B27	77 190 130 ±3% .01 uF +80-20%; 200 V 51, 200 V 39
5L	21-83406D91	40
5H	21-84494B30	34
0	21-82450B06	34 0.75 ±10% .001 uF ±10%; 100 V
7	21-8359bE13	.001 uF ±10%; 100 V
BL.	21-8340bD92	36
8H	21-8340°D56 21-84493B31	24
9L	21-84493B31	57; 200 V
9H 0	21-84494B28	43
	21-82428B62	01 "E 100 300 300 V
2L	21-83406703	16 dr 780-2078; 200 V
2H	Z1-83406D90	11
3 L	Z1-8340+D81	20
3H	21-8340bD55	18
4	21-82450B06	0.75 ±10°
5	21-83596E13	.001 uF ±10%; 100 V
bL.	Z1-83406D90	11
bH 7	21-83406D70	8 ±0.5 pF
8	21 92504 112	10 ±0.5 pF
9	21-8403-5	24. NDO
	21-8359cE10	220 +20%
L	21-84494B07	150
H	21-84494B06	120
2, 463	21-83596E13	.001 uF ±10%; 100 V
1	21-82355B62	1.0
	Z1-82428B59	100 Lg ± 10%; 100 V +01 uF +80-20%; 200 V 11 20 18 0,75 ±10F +001 uF ±10%; 100 V 11 0,5 pF 10 ±0,5 pF 100 uF ±10%; 100 V 24: NP0 220 ±20% 150 -001 uF ±10%; 100 V -001 uF ±10%; 100 V
	21-82810C23	0.0 ±,5%; 200 V

				 $\overline{}$
1	DE	SCRIPT	ION	

	21-82187B07	470 ±10%
C468	21-82187B07 21-82428B28 21-82187B06	.002 uF ±10%; 200 V
C469	21-82187B06	560
		DIODE: (SEE NOTE)
CR401	48-863030	germanium
CR402, 403		NOT USED
CD 404 405	48-82139G01	
CR404, 405	40-86139601	germanium
		COIL, rf:
E401	24 0420200-	40 ******* 020 ****
	24-04372000	40 turns on 820 ohm resistor
E402L	Z4-8439ZB13	15 turns on 560 ohm resistor
E402H	24-84392B05	40 turns on 820 ohm resistor 15 turns on 560 ohm resistor 9 turns on 560 ohm resistor
		CONNECTOR, receptacle:
J401		NOT USED
J402	9-84207B01	7 contacts
		0011
		COIL, rf:
L401	24-84389B02	18-2/3 turns; coded Black
L402	24-84389B01	18-1/2 turns; coded Yellow
L403	24 94390006	9 2/2 turner and d C
	24-043091300	0-2/3 turns; coded Green
L404	24-84389805	8-1/Z turns; coded Red
L405, 406	24-8497ZA09	6-1/2 turns; coded Yellow
L407, 408	24-84972A11	18-1/2 turns; coded Yellow 8-2/3 turns; coded Yellow 8-2/3 turns; coded Green 8-1/2 turns; coded Yellow 3-1/2 turns; coded Yellow 3-1/2 turns; coded Green NOT USED
L409	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	NOT USED
L410	24-80900A61	0, 62 mH
L411, 412	24-82835G08	2.6 uH; coded Red-Blue-Gold
L413	24-84923C01	1-1/2 turns
	27-04763301	- 1/0 -01/10
		CONNECTOR, plug:
P401		part of printed circuit board
P402	28-8428ZD01	
	20=04202001	
P403, 902		part of printed circuit board
		TRANSISTOR: (SEE NOTE)
0401	48-869642	NPN; type M9642
	10-00/012	NOT HOTE
Q402, 403		NOT USED
C404	48-869571	PNP; type M9571
Q405	48-869534	NPN; type M9534
C406	48-869390	ATTAL 1/0300
		NPN; type M9390 NPN; type M9867
£407,408	48-869867	NPN; type M9867
		RESISTOR, fixed: ± 5%; 1/4 W
	ł	unless otherwise stated
		unless otherwise stated
R401	6-124A43	unless otherwise stated 560 ohms
R401 R402	6-124A43 6-124A53	unless otherwise stated 560 ohms 1.5k
R402	6-124A53	unless otherwise stated 560 ohms 1.5k
R402 R403	6-124A53 6-124A79	unless otherwise stated 560 ohms 1.5k 18k
R402	6-124A53 6-124A79 6-124A87	unless otherwise stated 560 ohms 1.5k 1.8k 39k
R402 R403 R404	6-124A53 6-124A79 6-124A87 or6-124A89	unless otherwise stated 560 ohms 1.5k 18k 39k 47k
R402 R403	6-124A53 6-124A79 6-124A87	unless otherwise stated 560 ohms 1.5k 18k 39k 47k
R402 R403 R404	6-124A53 6-124A79 6-124A87 or6-124A89 6-124A85	unless otherwise stated 560 ohms 1.5k 18k 39k 47k
R402 R403 R404 R405	6-124A53 6-124A79 6-124A87 or6-124A89 6-124A85 or6-124A89	unless otherwise stated 560 ohms 1.5k 18k 39k 47k
R402 R403 R404 R405	6-124A 53 6-124A 79 6-124A 87 or6-124A 89 6-124A 85 or6-124A 89 6-124A 99	unless otherwise stated 5560 ohms 1.5k 1.8k 39k 47k 33k 47k 1.20k 1.20k
R402 R403 R404 R405 R406 R407	6-124A53 6-124A79 6-124A87 or6-124A89 6-124A85 or6-124A89 6-124A99 6-124B04	unless otherwise stated 5560 ohms 1.5k 1.8k 39k 47k 33k 47k 1.20k 1.20k
R402 R403 R404 R405 R406 R407 R408	6-124A53 6-124A79 6-124A87 or6-124A89 6-124A89 6-124A99 6-124B94 6-124B04	unless otherwise stated 5560 ohms 1.5% 1.5% 47K 39k 47K 130k 120k 120k
R402 R403 R404 R405 R406 R407 R408	6-124A53 6-124A79 6-124A87 or6-124A89 6-124A89 6-124A89 6-124A99 6-124A94 6-124A73	unless otherwise stated 550 ohms 1.5% 1.5% 47k 33k 47k 120k 180k
R402 R403 R404 R405 R406 R407 R408 R409	6-124A53 6-124A79 6-124A87 or6-124A89 6-124A89 6-124A89 6-124A99 6-124A94 6-124A73	unless otherwise stated 550 ohms 1.5% 1.5% 47k 33k 47k 120k 180k
R402 R403 R404 R405 R406 R407 R408 R409 R410	6-124A53 6-124A79 6-124A87 or6-124A89 6-124A89 6-124A89 6-124A99 6-124A94 6-124A73	unless otherwise stated 550 ohms 1.5% 1.5% 47k 33k 47k 120k 180k
R402 R403 R404 R405 R406 R407 R408 R409 R410 R411 thru 418	6-124A53 6-124A79 6-124A87 or6-124A85 6-124A85 6-124A89 6-124A99 6-124A99 6-124B94 6-124B1 18-83083G24	unless otherwise stated 550 ohms 1,5k 18 39k 47k 33k 47k 120k 160k 10k 22k variable: 25k ±30% NOT USED
R402 R403 R404 R405 R406 R407 R408 R409 R410	6-124A53 6-124A79 6-124A87 or6-124A89 6-124A89 6-124A89 6-124A99 6-124A94 6-124A73	unless otherwise stated 550 ohms 1.5% 1.5% 47k 33k 47k 120k 180k
R402 R403 R404 R405 R406 R407 R408 R409 R410 R411 thru 418	6-124A53 6-124A79 6-124A87 or6-124A85 6-124A85 6-124A89 6-124A99 6-124A99 6-124B94 6-124B1 18-83083G24	unless otherwise stated 550 ohms 1,5k 18 39k 47k 33k 47k 120k 160k 10k 22k variable: 25k ±30% NOT USED
R402 R403 R404 R405 R406 R407 R408 R409 R410 R411 thru 418 R419 thru 422 R423	6-124A53 6-124A79 6-124A87 or6-124A87 or6-124A89 6-124A89 6-124A99 6-124A73 6-124A73 6-124A73 6-124A74 6-124A79	unless otherwise stated 550 ohms 1, 5% 1,
R402 R403 R404 R405 R406 R407 R408 R409 R410 R411 thru 418 R419 thru 422 R423 R423	6-124A53 6-124A79 6-124A87 or6-124A87 or6-124A85 or6-124A89 6-124A99 6-124A91 6-124A91 18-83083G24 6-124A79 6-124A79 6-124A79	unless otherwise stated 550 ohms 1.5k 1.5k 1.8 39k 47k 33k 47k 120k 180k 180k 180k 180k 180k 180k 180k 18
R402 R403 R404 R405 R406 R407 R408 R409 R410 R411 thru 418 R419 thru 422 R423 R424 R424 R424 R424	6-124A 53 6-124A87 6-124A87 0r6-124A89 6-124A89 6-124A99 6-124B94 6-124A91 18-83083G24 6-124A77 6-124A77 6-124A57 6-124A57	unless otherwise stated 550 ohms 1, 5% 1,
R402 R403 R404 R405 R406 R407 R408 R409 R410 R411 thru 418 R419 thru 422 R423 R423	6-124A 53 6-124A87 6-124A87 0r6-124A89 6-124A89 6-124A99 6-124B94 6-124A91 18-83083G24 6-124A77 6-124A77 6-124A57 6-124A57	unless otherwise stated 550 ohms 1.5k 1.5k 1.8 39k 47k 33k 47k 120k 180k 180k 180k 180k 180k 180k 180k 18
R402 R403 R404 R405 R406 R407 R408 R409 R410 R419 thru 418 R419 thru 422 R423 R424 R425 R425	6-124A 53 6-124A87 6-124A87 0r6-124A89 6-124A89 6-124A99 6-124B94 6-124A91 18-83083G24 6-124A77 6-124A77 6-124A57 6-124A57	unless otherwise stated 550 ohms 1.5k 1.5k 18 39k 47k 33k 47k 120k 180k 180k 180k 180k 180k 180k 180k 18
R402 R403 R404 R405 R406 R407 R408 R409 R409 R410 R411 thru 418 R412 R423 R424 R424 R425 R426 R427	6-124A53 6-124A87 6-124A87 6-124A87 6-124A85 0-124A85 0-124B04 6-124B04 6-124A73 6-124A73 6-124A81 6-124A73 6-124A81 6-124A81 6-124A81 6-124A81 6-124A81	unless otherwise stated 5560 ohms 1, 5% 188 399, 8 399, 8 318 476 1206 1806 1806 1807 1808 1808 1808 1808 1808 1808 1808
R402 R403 R404 R405 R406 R407 R407 R408 R409 R411 thru 418 R411 thru 422 R423 R424 R425 R426 R427 R427 R427	6-124A53 6-124A89 6-124A89 6-124A89 or6-124A89 6-124A99 6-124A93 6-124A73 6-124A73 6-124A73 6-124A74 6-124A74 6-124A87	unless otherwise stated 550 ohms 1.5k 1.5k 18 39k 47k 33k 47k 126k 126k 127k 128k 128k 128k 128k 128k 128k 128k 128
R402 R403 R404 R405 R406 R407 R408 R408 R409 R409 R410 R411 thru 418 R412 R422 R423 R424 R424 R425 R426 R427 R428 R429 R428	6-124A79 6-124A89 6-124A89 6-124A89 6-124A89 6-124A89 6-124B04 6-124B04 6-124A99 6-124B04 6-124A73 6-124A79 6-124A87 6-124A87 6-124A87 6-124A87 6-124A87	unless otherwise stated 550 ohms 1.5k 1.5k 18k 39k 47k 1.20k 180k 180k 180k 180k 180k 180k 180k 18
R402 R403 R404 R405 R406 R407 R407 R408 R409 R411 thru 418 R411 thru 422 R423 R424 R425 R426 R427 R427 R427	6-124A79 6-124A89 6-124A89 6-124A89 6-124A89 6-124A89 6-124B04 6-124B04 6-124A99 6-124B04 6-124A73 6-124A79 6-124A87 6-124A87 6-124A87 6-124A87 6-124A87	unless otherwise stated 550 ohms 1.5k 1.5k 18k 39k 47k 1.20k 180k 180k 180k 180k 180k 180k 180k 18
R402 R403 R404 R405 R406 R407 R408 R409 R409 R410 R411 thru 418 R412 R424 R424 R424 R425 R426 R427 R428 R427 R428	6-124A79 6-124A89 6-124A89 6-124A89 6-124A89 6-124A89 6-124B04 6-124B04 6-124A99 6-124B04 6-124A73 6-124A79 6-124A87 6-124A87 6-124A87 6-124A87 6-124A87	unless otherwise stated 550 ohms 1.5k 1.5k 18k 39k 47k 1.20k 180k 180k 180k 180k 180k 180k 180k 18
R402 R403 R404 R405 R406 R407 R408 R407 R409 R410 R411 thru 418 R419 thru 422 R424 R424 R425 R426 R426 R427 R428 R427 R428 R429 R430 R410 R410 R410 R410 R410 R410 R410 R41	6-124A53 6-124A87 6-124A87 6-124A89 6-124A89 6-124A89 6-124B94 6-124A94 6-124A73 6-124A73 6-124A73 6-124A74 6-124A75 6-124A81 6-124A87 6-124A87 6-124A87 6-124A87 6-124A87	unless otherwise stated 550 ohms 1.5% 1.8% 1.8% 39% 47k 13% 47k 120k 180k 180k 180k 180k 180k 180k 180k 18
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R402 R403 R404 R405 R406 R407 R407 R408 R419 R411 R411 thru 418 R419 thru 422 R423 R425 R426 R427 R427 R427 R428 R428 R429 R429 R429 R429 R429 R429 R429 R421 R431 R431 R431 R431 R431 R431 R431 R43	6-124A53 6-124A89 6-124A89 6-124A89 6-124A89 6-124A99 6-124A99 6-124A93 18-83083C24 6-124A79 6-124A95 6-124A95 6-124A95 6-124A95 6-124A95 6-124A95 6-124A96 6-124A96 6-124A96 6-124A96 6-124A97 6-124A96	unless otherwise stated 550 ohms 1, 50k 1, 5
R402 R403 R404 R405 R407 R406 R407 R408 R409 R410 R411 thru 418 R412 R423 R423 R424 R426 R426 R426 R427 R428 R427 R428 R429 R431 R410 R411 R412 R410 R411 R413 R410 R411 R413 R410 R411 R413 R415 R415 R415 R416 R416 R417 R418 R419 R410 R411 R418 R410 R411 R411 R411 R411 R411 R411 R411	6-124A59 6-124A89 6-124A89 6-124A89 6-124A89 6-124A89 6-124A89 6-124A73 6-124A73 6-124A73 6-124A73 6-124A73 6-124A85	unless otherwise stated 550 ohms 1,5% 18 38 38 37 37 47 120 180 180 180 180 180 180 180 180 180 18
R402 R403 R404 R405 R406 R406 R407 R408 R410 R411 thru 418 R419 thru 422 R423 R424 R425 R426 R427 R427 R428 R428 R429 R429 R431 R431 R431 R431 R431 R431 R431 R431	6-124A53 6-124A87 6-124A87 6-124A89 6-124A89 6-124A99 6-124A99 6-124A91 8-124A73 6-124A73 6-124A73 6-124A57 6-1	unless otherwise stated 550 ohms 1, 50k 1, 5
R402 R403 R404 R405 R407 R406 R407 R408 R409 R410 R411 thru 418 R422 R423 R422 R423 R424 R424 R424 R425 R425 R426 R427 R431 R431 R431 R431 R431 R431 R431 R431	6-124A59 6-124A89 6-124A89 6-124A89 6-124A89 6-124A99 6-124A99 6-124A91 6-124A73 6-124A73 6-124A73 6-124A57 6-124A57 6-124A57 6-124A57 6-124A57 6-124A57 6-124A58	unless otherwise stated 550 ohms 1.5% 188 379 379 378 378 478 1206 1806 1806 1806 1806 1806 1807 1808 222 228 234 1.28 248 248 258 270 ohms NOT USED 396 2.70 ohms 3.98 NOT USED 390 ohms 1.51 3.98 NOT USED 3.98 NO
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R402 R403 R404 R405 R406 R407 R408 R409 R409 R411 Hru 412 R412 R412 R412 R412 R412 R412 R413 R413 R413 R413 R413 R413 R413 R413	6-124A53 6-124A89 6-124A89 6-124A89 6-124A89 6-124A89 6-124A93 6-124B94 6-124A73 6-124A93 6-124A93 6-124A93 6-124A93 6-124A93 6-124A93 6-124A93 6-124A93 6-124A93 6-124A93 6-124A94	unless otherwise stated 550 ohms 1, 5% 1,
R402 R403 R404 R405 R407 R406 R407 R408 R409 R410 R411 thru 418 R422 R423 R422 R423 R424 R424 R424 R425 R425 R426 R427 R431 R431 R431 R431 R431 R431 R431 R431	6-124A53 6-124A89 6-124A89 6-124A89 6-124A89 6-124A89 6-124A93 6-124B94 6-124A73 6-124A93 6-124A93 6-124A93 6-124A93 6-124A93 6-124A93 6-124A93 6-124A93 6-124A93 6-124A93 6-124A94	unless otherwise stated 550 ohms 1.5k 118 39k 47k 47k 13k 47k 110k 120k 180k 180k 180k 180k 180k 180k 180k 18

C467 21-82187B07 470 ±10%

	REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
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NO	N-REFERENCE	DITEMS
	14-861196	INSULATOR, transistor: 2 req'd. (used with Q407 & Q408)
	26-83379H01 26-84598A01	HEAT SINK (used with Q408) SHIELD, coil; 4 req'd, (used with L405 thru L408)
	26-84598A02	SHIELD, coil; 4 req'd. (used with L401 thru L404)
	42-84284B01 3-139506	RETAINER; 4 req'd. SCREW, tapping: Phillips round hd., 4-40 x 5/16"
		4 req'd. (used for mounting Retainers)
	55-84300B01 30-83794C01	HANDLE CABLE, coaxial; 6" req'd. (used with P402)
	29-84028H01 29-84028H02 29-855943	TERMINAL, pin; 19 req'd. TERMINAL, pin; 12 req'd. TERMINAL, pin; 16 req'd.
	39-10184A10	CONTACT, terminal; 10 req'd,

NOTE: For optimum performance, replacement diodes and transistors must be ordered by Motorola part numbers.

	PEPS-18716-D		
CHASSIS AND SUFFIX NO.	REF. SYMBOL	CHANGE	LOCATION
TLD549lA TLD5492A	R428	FROM 6-124C85; 33k TO 6-124C87, 39k	PARTS LIST
	R437	FROM 6-124C97, 100k TO 6-124C94: 82k	
	(400	FROM 21-82428B28, .002 uF. ±10%, 500 V	
		TO 21-82610C23, 6.8 pF; ±,5%, 200 V	
	R401,	ALTERNATE	PARTS LIST
	R405	6-124A89 47k ±5%; 1/4 W ADDED	
	E1.0	From 6-124C88, 27k To 6-124C81, 22k	Meter I

SHOWN FROM SOLDER SIDE

SOLDER SIDE BO-DEPS-16779-D COMPONENT SIDE BO-DEPS-16780-0 OL-DEPS-18717-C

409. In Private-Line radios, P902-5 is not connected to the transmitter

410. The tripler/low level amplifier "box" is not repairable. If defective, it must be replaced. This also applies to the 1st and 2nd bandpass filters 411. R402 and R403 removed when flat audio board is used 412. JU402 added when flat audio board is used

413. When PL squelch is used, signal name of P401-10 is Code Input; P401-4 and P902-8 is Delayed Keyed A + ; P401-2 and P902-10 is Keyed A + . When flat audio board option is used, signal name of P401-10 is IDC Limited Audio; P401-4 and P902-8 is Flat Audio; P401-2 and P902-10 is Flat Audio Control.

Model Complement

TFD6371A TFD6373A TFD6374A TFD6375A TLD5491A TLD5492A

Exciter Board

Assembly

Exciter/1st Bandpass

TLE1724B (470-494 MHZ)

1. - DSCILLATOR CRYSTAL FREQUENCY I - EXCITER OUTPUT FREQUENCY

EXCITER/1ST BANDPASS FILTER

MODEL TLE1720B SERIES

TRIPLER/LOW LEVEL AMPLIFIER

MODEL TLE1600B SERIES

FUNCTION

Exciter - Produces modulated RF signal in 135-171 MHz range,

1st Bandpass Filter - Attenuates signals outside the bandpass range.

Tripler/Low Level Amp. - Triples exciter output frequency and amplifies that signal to drive the following

Model Complement Note 410

Tripler/Low Level TLNS650B TRN8728A TLE8391A TLE8393B TLE8394B TLE8395B TFE6151A TFE6153A TFE6154A TFE6155A

Motorola No. PEPS-18716-H (Sheet 2 of 2) 10/5/82 - V & G



Communications Sector

PAGING SYNTHESIZER

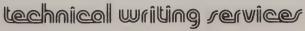
MODELS: TLB1562A 30-36 MHz TLB1563A 36-42 MHz TLB1564A 42-50 MHz TLD2593A 150-174 MHz TLE2273A 450-512 MHz

PERFORMANCE SPECIFICATIONS

Frequency Stability With HSO (High Stability Osc) Without HSO	Same as HSO (\pm .02 ppm) \pm 2 ppm $-$ 30 to $-$ 60 °C				
Supply Voltage Requirements	$+13.8 \text{ V dc} \pm 20\%$				
Supply Current Drain	500 mA, maximum				
Spurious and Harmonic Emissions	More than 85 dB below carrier				
FM Noise With EIA Pre-emphasis With Flat Audio	55 dB 40 dB				
Audio Response	±0.5 dB; 300 Hz to 3 kHz				
Audio Harmonic Distortion	Less than 1% at ±3 kHz				
Audio Sensitivity Low Band Other Bands	3 V to 4 V p-p for ±5 kHz at 1 kHz 2 V to 3 V p-p for ±5 kHz at 1 kHz				
DC Deviation Range at Fc	±3 kHz to ±5 kHz				
Data Deviation Range at Fc .	±3 kHz to ±5 kHz				
Data/Voice Mode Transient	Less than 100 Hz peak				
Data Rise Fall Time	Less than 400 usec				
RF Output	0.3 V rms to 1 V rms				
Frequency Ranges: Low Band 30-50 MHz High Band 150-174 MHz VHF 450-512 MHz 900 MHz 928-960 MHz	10.0 to 16.666 MHz 12.5 to 14.5 MHz 12.5 to 14.222 MHz 12.888 to 13.333 MHz				

PAGING SYNTHESIZER INTERFACE REQUIREMENTS

HSO Supply Voltage	$24 \text{ V dc} \pm 10\%$				
HSO Power Consumption	11 watts, max.				
Synthesizer Supply Voltage	13.8 V dc ± 20%				
Synthesizer Current Drain	500 mA dc				
HSO RF Level	More than 1.0 V rms @ 50 ohms				
Synthesizer RF Output Level	More than 0.3 V rms into cable terminated by exciter				
Audio Input Level Data Levels Data Enable Levels	More than 4 V peak to peak @ 1 kHz "1" — More than 4 V "0" — Less than 0.7 V Enable — More than 7 V Disable — Less than 0.7 V				
RF Enable Input	Enable — Less than 0.7 V (I Source = 4 mA Disable — More than 9 V				
Out of Lock Indicate	Isink less than 4 mA dc				
Synthesizer Metering	TEK-5 or equivalent				



PAGING SYNTHESIZER MODEL CHART FREQ. RANGE 450-512 MHz 150.8-174 MHz 42-50 MHz 36-42 MHz 30-36 MHz CODE: TLE2273A TLD2593A TLB1564A TLB1563A TLB1562A = ONE ITEM SUPPLIED ITEM DESCRIPTION TRN5058A REGULATOR BOARD TRN5446A SYNTHESIZER CABLE TRN5447A SYNTHESIZER HARDWARE TLB8502A SYNTHESIZER BOARD 30-36 MHz TLB8503A SYNTHESIZER BOARD 36-42 MHz TLB8504A SYNTHESIZER BOARD 42-50 MHz TLD9333A SYNTHESIZER BOARD 150.8-174 MHz TLE5493A SYNTHESIZER BOARD 450-512 MHz

EPS-34980-O

1. GENERAL DESCRIPTION

The paging synthesizer is a standard 19" rack mounted unit designed for use in Motorola Micor Paging Base Stations. The paging synthesizer provides a modulated rf signal to drive the exciter. Modulation can be either analog (voice and tones) or digital (binary paging codes or equivalent). Digital modulation including dc is made possible by the technique of dual-port modulation, where dc and low frequency data components are controlled by the digital modulation circuit. The higher frequency components of modulation (greater than 1 Hz) are accommodated by direct frequency modulation (fm) of the synthesizer voltage controlled crystal oscillator (VCXO or channel element). The paging synthesizer also provides high frequency stability by optional phase-locking to 100 kHz, 1 MHz, 5 MHz (standard) or 10 MHz high stability reference oscillators. Refer to the voltage regulator board and paging synthesizer schematic and block diagrams for the following descriptions. Figures 1 and 2 show component location and the solder side shield location.

2. FUNCTIONAL BLOCK DESCRIPTIONS

- 2.1 9.6 V AND 5 V REGULATORS (Refer to PEPS-34965 for details)
- 2.1.1 The 9.6 V regulator consists of a series pass transistor (Q400) which is driven by the regulator integrated circuit (U400). The regulated 9.6 V dc is provided to all analog and rf circuits, and is derived from the station 12 V dc supply (typically 13.6 V dc).
- 2.1.2 The 5 V regulator is derived from the regulated 9.6 V dc supply, and provides regulated 5 V dc to all logic circuits requiring 5 V dc. The 5 V regulator consists of a 3-terminal integrated circuit (U401).
- 2.2 REFERENCE AMPLIFIER AND SWITCH (Q24, Q23)
 (Refer to Paging Synthesizer diagrams PEPS-34989 for details)

The reference amplifier and switch amplify the high stability oscillator signal to the proper logic levels and shape, for application to integrated circuits U14 and U16.

2.3 REFERENCE DIVIDER (U14, U15, U16)

The reference divider divides the High Stability Oscillator (HSO) frequency down to 100 kHz for use in phase locking U18, the 14.4 MHz oscillator. HSO frequencies of 100 kHz, 1 MHz, 5 MHz, or 10 MHz can be programmed by jumpers JU20 and JU21.

2.4 REFERENCE PHASE DETECTOR (U17)

One section of U17, (quad exclusive-OR gate) is used as a reference phase detector. The output consists

of pulses at 200 kHz, (twice the input frequency) having a width dependent on the phase error between the two input signals to U17.

2.5 REFERENCE LOOP FILTER (Q22 with associated circuitry)

Q22 amplifies the output pulses of U17 to approximately 8 volts peak-to-peak. R61, C62, R60, and C61 form an integrator circuit which recovers the dc value of Q22 output pulses, for use in controlling the frequency of U18 (14.4 MHz voltage controlled crystal oscillator, VCXO).

2.6 14.4 MHz VOLTAGE CONTROLLED CRYSTAL OSCILLATOR (U18)

U18 is a 14.4 MHz voltage controlled crystal oscillator which is phase-locked to the HSO. The output of U18 is used to provide one of the phase detector (U17) inputs, and also provide an input to the digital modulator circuitry (U11).

2.7 REFERENCE LOOP AMPLIFIER (Q21, Q20, Q19)

The reference loop amplifier amplifies U18 output signal to the proper logic levels and shape for application to U19 (reference loop divider) and U11 (digital modulator).

2.8 REFERENCE LOOP DIVIDER (U19, U20)

Reference loop dividers U19 and U20 divide the output frequency of Q19 by 144. This is the 100 kHz feedback signal to the phase detector (U17), which is compared in phase to the 100 kHz signal derived from the HSO.

- 2.9 DIGITAL MODULATOR (U9, U10, U11, U12, U13)
- 2.9.1 This circuit frequency modulates the output signal of Q19 to the "one" and "zero" frequencies upon command of the pulse insertion oscillator, integrated circuit dividers U5 through U8.
- 2.9.2 Pulse insertion results in positive deviation by inserting extra pulses into the 14.4 MHz pulse train at the appropriate rate. This takes place in integrated circuit U12 (exclusive-OR gate with the input on pins 4 and 5; output on pin 6).
- 2.9.3 Pulse blanking, similiarly, creates negative deviation by blanking pulses from the 14.4 MHz pulse train at the appropriate rate. This occurs in integrated circuit U11 (input pins 12 and 13, output pin 11).
- 2.9.4 Pulse insertion is selected upon command by a data enable and a data "one". Pulse blanking is

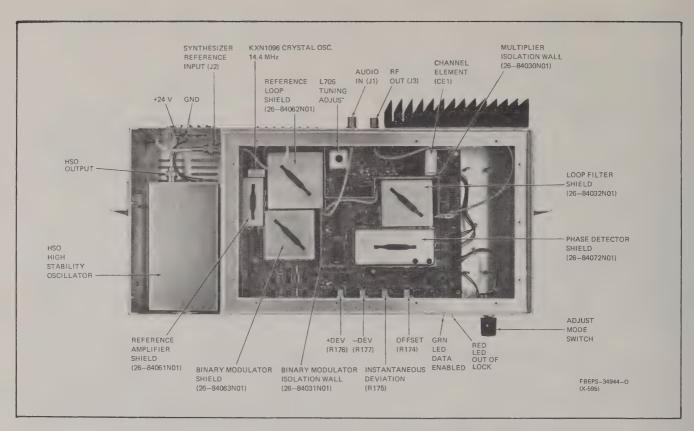
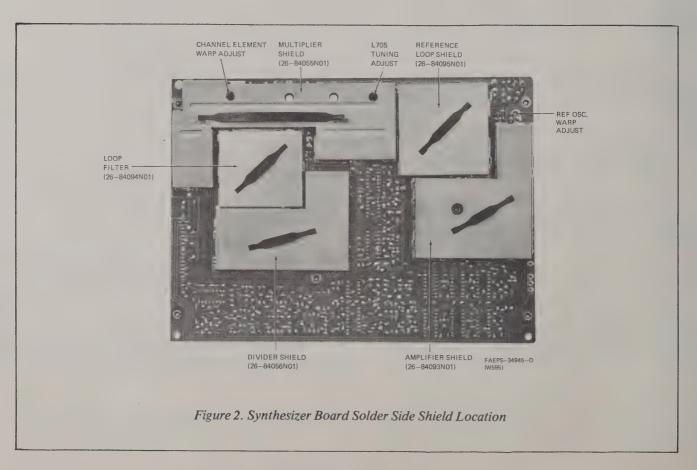


Figure 1. Paging Synthesizer Component Location



selected upon command by a data enable and a data "zero". The appropriate rate of insertion pulses or blanking pulses is determined by the following formula:

$R = \frac{Deviation \times 14.4 MHz}{Carrier Frequency (MHz)}$

The frequency modulated 14.4 MHz is divided by two to 7.2 MHz, by U13 (input pin 11, output pin 9) and serves as the reference input for the main synthesizer loop phase detector U602.

2.10 PULSE INSERTION OSCILLATORS AND DIVIDERS (U1 and U3-U8)

U1 is a dual timer which serves as two independent RC oscillators. The outputs are frequency divided by U3 through U8 to obtain the pulse insertion and blanking rates mentioned in paragraph 2.9. These are necessary for (+) and (-) data deviation of the 14.4 MHz signal. R176 and R177 are precision potentiometers for setting the "one" and "zero" (or + and -) deviations respectively. In order to obtain the proper deviations, jumpers JU1 through JU18 which set the divider ratios, must be properly installed.

2.11 MAIN LOOP DIVIDER (U602), ROM (U604)

2.11.1 U602 is an integrated circuit which is used to divide the 7.2 MHz reference input (pin 2) to either 2.0833 kHz or 2.500 kHz output (pin 5) depending on the frequency band (900 MHz, UHF, HB, or LB respectively). The internal ÷63/÷64 prescaler is driven by U601 and in turn drives the A and B dividers internally. The choice of 2.0833 kHz, or 2.500 kHz, and the numbers programmed into the A and B dividers are stored in U604 and called out on "D" lines (U604-12,11,10,9) by U602 addressing the "A" lines U604-5,6,7.

2.11.2 The A and B dividers provide the loop output at 2.0833 kHz or 2.500 kHz (U602-9). This frequency is derived from the channel element (CE1). U602 pin 9 is also used to signal the $\div 3/\div 4$ prescaler (U601) when to divide by 4 rather than 3. The $\overline{C0}$ and $\overline{C1}$ lines (pins 15 and 16) signal to U601 how many times to divide by 4 rather than 3. This information is stored in U604 ROM and (like A and B divider programs) differs from channel to channel.

2.12 SAMPLE AND HOLD PHASE DETECTOR (U603)

Integrated circuit U603 is used to compare the two divider IC output phases (2.0833 kHz or 2.500 kHz depending on the frequency band). It ultimately generates an output signal on pin 15, which after further filtering and amplification, is used to control the frequency of the channel element (CE1).

2.13 LOOP DC AMPLIFIERS (U609, U21) LOOP FILTERS, AND LOOP SUMMERS (U21)

- 2.13.1 U609 is a dc amplifier with a gain of approximately 11; this amplifies the output signal from U603 and applies it to the loop filter.
- 2.13.2 The loop filter is composed of R122, R123, C23, C24, and C28. It is a standard lead-lag filter and results in a loop bandwidth of about 1/2 Hz, with a damping factor of approximately 0.65. These parameters determine the cross-over between pulse insertion/blanking modulation, and the modulation summed in this loop is approximately 1 Hz.
- 2.13.3 The first loop summer (U21-8,9,10) adds binary modulation to the loop dc control voltage and amplifies the data amplitude by a factor of 2. Following the first loop summer is a 3 kHz passive RC low pass filter (R79, R78, R77, C74, C75, and C76), which has no effect on the dc control voltage, but shapes the data modulation to prevent excessive modulation sideband splatter. This filter is buffered by unity gain amplifier Q25, Q26.
- 2.13.4 U21 pins 2 and 3 is the second loop summer which is used to sum voice or tone modulation with the loop dc control voltage. For modulation, it has a voltage gain of unity; for the loop signals, it has a voltage gain of two. The output (pin 1) is applied directly to the channel element (CE1) modulation port (pin 4). This controls the channel element frequency so that it is phase locked to the 7.2 MHz output of the digital modulator circuit, and also directly frequency modulates it with voice or tones, or splatter filtered data.

2.14 CHANNEL ELEMENT (CE1)

The channel element serves as the voltage crystal oscillator (VCO) in the main synthesizer loop, and provides an output signal between 10 and 16-2/3 MHz. The output signal is amplified and drives the exciter in the transmitter portion of the base station.

2.15 EXCITER AMPLIFIER/BUFFER SWITCH (Q701, Q36, Q37, CR1, CR2)

Q701 amplifies the output of channel element (CE1) to the proper level to drive a base station exciter. Q36 and Q37 buffer the output of Q701 to prevent loading by the coaxial cable used to connect it to the base station exciter. CR1 and CR2 PIN diodes used in a series-shunt rf switch greatly attenuate the signal delivered to the base station exciter, if rf enable is a high level dc signal. The output of the synthesizer (Q36 and Q37 emitters) is frequency multiplied in the base station, just as a normal channel element signal would be: \times 3 for low band, \times 12 for high band, \times 36 for UHF, and \times 72 for 900 MHz.

2.16 FREQUENCY MULTIPLIERS (Q706, Q702, Q703, Q704) AND BUFFER (Q40)

2.16.1 For low band models, Q702 and Q703 are not used. Q706 is a unity gain amplifier, and Q704 and associated components form a frequency tripler. The output of Q704 is limited in amplitude by CR6 and CR7, buffered by Q40 before being applied to U601 pin 1 (divide by 3; divide by 4 prescaler).

2.16.2 For all other models, Q706 is a unity gain buffer, Q702 is a frequency tripler, and Q703 and Q704 are both frequency doubling stages. The overall frequency multiplication is a factor of 12. CR6, CR7, and Q40 are as described before. Low band and the other frequency bands differ so that the phase detector input frequencies may remain reasonably high and still achieve the desired channel spacings.

2.17 PRESCALER ÷ 3/ ÷ 4 (U601)

2.17.1 U601 is normally used to allow synthesizer operation from a 400 MHz or higher voltage controlled oscillator. In this paging synthesizer the highest frequency from Q40 is 174 MHz. U601 used in this application with frequency multipliers, allows all of the desired channel spacings to be achieved without resorting to excessively low phase detector (U603) input frequencies.

2.17.2 $\overline{\text{C0}}$ and $\overline{\text{C1}}$ (U601 pins 7 and 6) receive instructions from U604 via U602 as to how many cycles of its operation U601 should be in the divide by 4 mode during a loop pulse period (loop pulse is signaled from U602 pin 9 to U601 pin 5). In this manner an assortment of non-integer divisors are achieved. The total frequency divisor from CE1 pin 3 to U602 pin 9 is:

Low Band:
$$N_T = \frac{3(64A + 63B) + C}{3}$$
Other Bands: $N_T = \frac{3(64A + 63B) + C}{12}$

Where A and B are U603 divider programs, and C is the U601 program.

2.18 LOSS OF LOCK DETECTOR (U606, U607)

The loss of lock detector consists of two voltage comparators (both within U606); a reference loop detector and a main loop detector. The outputs of these are combined in U607, a quad OR-gate. The output of U607 is dc amplified by Q39, stored in delay capacitor C93, and used to inhibit transmitter keying by Q33 in the event of loss of lock. The delay time constant C93, R164 are used to prevent false transmission during acquisition of lock or other transient or oscillatory conditions. Q32 drives DS3 which provides a visual indication for out of lock condition.

2.19 BINARY MODULATOR (Q3-5, Q9-14, Q31, Q42, Q43, U22)

2.19.1 The binary modulator performs two functions: First, it translates data levels to precisely the peak-to-peak voltage level necessary for modulation of the main synthesizer loop via U21 pin 10. This is adjustable via R174. Secondly, it provides a dc level which is superimposed on the data applied to U21 pin 10. This level is adjustable (in the data enable mode) by R175. This dc level is necessary for the following conditions:

- To change the data levels, so they are symmetrical about the main loop dc control voltage for equal plus and minus frequency deviations.
- To change the data levels so they are not symmetrical about the main loop dc control voltage for unequal plus and minus frequency deviations, if desired.

Q3,4,9,13, and 14 perform the first condition by switching R174 to either a fixed high level voltage (data "1") or a fixed low level voltage (data "0"). R174 is switched by either Q13 or Q14, but not both simultaneously. The resistance setting of R174 along with fixed resistors R137 and R134 determine the voltage amplification of op. amp. U22 for the data levels.

2.19.2 The circuit composed of Q5, Q31, Q42, and Q43 connects R175 into the circuit in the data enable mode. Switching transistors Q42 and Q43 are both on at the same time thus connecting R175 between regulated 9.6 V dc and ground. The voltage setting of R175 provides the adjustable dc level function mentioned above in the data enable mode. This voltage is summed with the data in the op. amp. U22 via R133 and R134 which provides unity gain for this level. DS2 provides a visual indication of the data enable mode.

2.20 DATA SIMULATOR (U23)

2.20.1 This circuit provides a simulated 300 bps data stream which, when selected by the rotary switch S1 (INSTANTANEOUS DEVIATION ADJUST position) on the synthesizer panel allows the peak-to-peak data deviation to be set using R174.

2.20.2 In the OFFSET ADJUST mode of rotary switch S1, a simulated data stream and a pulsating data enable are available. This allows for a convenient setting of the data bias, R175, by adjusting for minimum frequency transient upon change of data enable states (voice/tone to data, and vice versa). Final adjustment of R174 and R175 cannot be made until the +DEV (R176) and -DEV (R177) controls are set. The rotary switch must always be returned to the normal (OPERATE) position after servicing the station. An ADJUST MODE LED (DS3) is provided to indicate if the switch is not in the OPERATE mode.

2.20.3 U23 is a self contained RC oscillator and frequency divider. Oscillation of U23 is controlled by R139, R140, and C81. The frequency of oscillation determines the rate of the simulated data stream. Q34 buffers the simulated data for application to the binary modulator through the rotary switch when selected. U23 further frequency divides the oscillation frequency to provide a simulated pulsating data enable signal of approximately 1.5 Hz. This circuit is included as an aid to servicing and alignment, and is not normally activated during system operation.

3. SUMMARY

The paging synthesizer allows analog or digital (binary) modulation of paging base stations including low band, high band, and UHF. It not only provides de modulation capability, but high stability transmitter frequency at the same time; this is necessary for simulcast system applications.

4. ALIGNMENT PROCEDURE

4.1 GENERAL

Monitor the transmitter output frequency with an adequate frequency counter (typically accurate to ± 1 Hz). The transmitter modulation should be monitored with a Motorola Service Monitor (R1200) with a deviation meter or equivalent.

4.2 MULTIPLIER (Use a Motorola TEK-5 or equivalent metering panel.)

Step 1. Low Band — Peak L705 on Meter 3.

Step 1A. Other Bands —

- Peak L703 on Meter 1
- Peak L704 on Meter 2
- Peak L705 on Meter 3

Step 2. Repeat Step 1A.

4.3 14.4 MHz VOLTAGE CONTROLLED CRYSTAL OSCILLATOR (VCXO)

Adjust U18 warp coil (located through small hole on top of chassis, (see Figure 3) for 1.5 V ± 0.1 V dc at test point 1 (junction of C82 and R150). A high resistance voltmeter (11 megohm, R1002 or equivalent) must be used.

4.4 CHANNEL ELEMENT (CE1)

Step 1. Set the adjust mode switch on the synthesizer to the OPERATE mode. **DO NOT** apply any modulating signals.

Step 2. Set CE1 warp capacitor for $4.7 \text{ V} \pm 0.3 \text{ V}$ dc at test point 2 (junction of R151 and C83). Use a high resistance voltmeter as before. Refer to Figure 3 for location of tuning hole.

4.5 HIGH STABILITY OSCILLATOR (HSO)

The high stability oscillator (Y1) should be allowed to warm up for at least 30 minutes before proceeding any further. This is necessary for the oven in the oscillator to reach its operating temperature.

Step 1. Key the transmitter.

Step 2. Adjust the HSO to the assigned transmitter output frequency $\pm 10 \, \text{Hz}$.

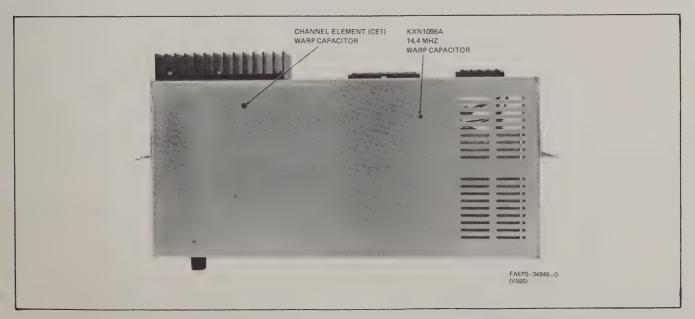


Figure 3. Synthesizer Tuning Adjustment Location

Step 3. Repeat paragraphs 4.3 and 4.4.

4.6 TSI MODULE (+ DEV and - DEV)

- Step 1. Set the panel switch on the synthesizer to the OPERATE position.
- Step 2. Set the switch on the TSI module to the TEST position.
- Step 3. Pulse Insertion Select the + deviation position of the switch on the TSI module. Set R176 (+ DEV) on the synthesizer panel for the transmitter output frequency of $F_T + 4.000 \, kHz$.
- Step 4. Pulse Blanking Select the deviation position of the switch on the TSI module. Set R177 (– DEV) on the synthesizer panel for transmitter output frequency of F_T 4.000 kHz.
- Step 5. Return the TEST switch on the TSI module to the normal position.

4.7 INSTANTANEOUS DEVIATION ADJUST (R174)

Step 1. Set the panel switch on the synthesizer to the INSTANTANEOUS DEVIATION ADJUST mode. The adjust mode and data enable lamps should light. The transmitter is now modulated with simulated data.

Step 2. Set R174 on the synthesizer panel for ± 4.0 kHz deviation.

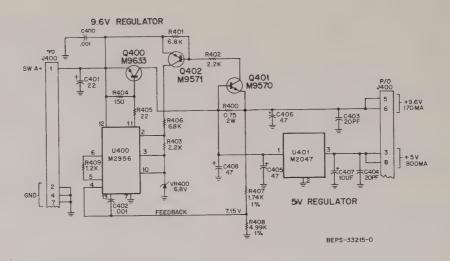
4.8 OFFSET (R175)

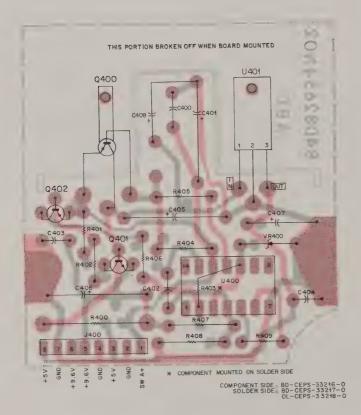
- Step 1. Disconnect the out-of-lock (transmitter inhibit) line to the station.
- Step 2. Set the panel switch on the synthesizer to the OFFSET ADJUST position. The adjust mode lamp should be lit, and the data enable lamp should be pulsating slowly.
- Step 3. Set R175 on the synthesizer for minimum transient or bounce on the transitions from no modulation to data modulation or vice-versa.
- Step 4. Re-connect the out-of-lock line to the station. The station should remain keyed. The out-of-lock lamp should not be lit.
- Step 5. Return the panel switch to the OPERATE position. The adjust mode lamp should not be lit, and the data enable lamp should be lit if the modem is detecting data.

4.9 HIGH STABILITY OSCILLATOR

Readjust the HSO if necessary and place the station back in service.







SHOWN FROM COMPONENT SIDE

parts list

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	
		capacitor, fixed: uF ± 10%;	
		unless otherwise stated	
C400	21-83596E13	.001; 500 V	
C401	23-84762H16	22; 20 V	
C402	21-83596E13	.001; 500 V	
C403, 404	21-11014H32	20 pF ± 5%; 100 V	
C405, 406	23-83214C31	47 ± 20%; 15 V	
C407	23-84762H03	10; 20 V	
C408	23-83214C31	47 ± 20%; 15 V	
		connector, plug:	
J400	28-83323N02	male; 8-contact	
		transistor: (see note)	
Q400	48-869633	PNP; type M9633	
Q401	48-869570	NPN; type M9570	
Q402	48-869571	PNP; type M9571	
		resistor, fixed: ohms $\pm 5\%$; 1/4 W;	
		unless otherwise stated	
R400	17-82036G13	0.75; 2 W	
R401	6-185A69	6.8k; 1/8 W	
R402, 403	6-185A57	2.2k; 1/8 W	
R404	6-11009A29	150	
R405	6-11009A09	22	
R406	6-185A69	6.8k; 1/8 W	
R407	6-10621C18	1740 ± 1%	
R408	6-10621C62	4990 ± 1%	
R409	6-185A51	1.2k; 1/8 W	
		integrated circuit: (see note)	
U400	51-83629M56	regulator; 9.6 V	
U401	51-84320A47	regulator; 5 V	
		voltage regulator: (see note)	
VR400	48-82256C37	Zener; 6.8 V; 1 W	

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.

TRN5058A Voltage Regulator Board Schematic Diagram, Circuit Board Detail, and Parts List Motorola No. PEPS-34965-O 7/14/82 - V&G

DESCRIPTION

fixed: 50-10%; 35 V -20%; 25 V); 200 V 50-10%; 35 V %; 100 V

note)

lifier; 200 V

(see note) M9642 M9428

ed: ±5%; 1/4 W:

ulator: (see note) 6.8 V

achine; 6-32 x 5/16"; 2 used ; 2 used

PL-8111-0

DESCRIPTION

xed: 00 - 10%; 100 V

V; slow blow type

see note) 19627

lide

WHT, BLK-GRN; res. 29 ohms rEL, BLK-RED; res. 32 ohms BRN-YEL with BLK center top;

ard:

plug:

tact

11/32 × 1/8"; 4 used chine: 6-32 × 5/8"; 2 used ping: 4-40 × 5/16"; 4 used ping: 4-40 × 1/4"; 4 used ping: 6-32 × 5/16"; 4 used ping: 6-32 × 5/16"; 4 used houlder; 2 used houlder; 2 used useholder neat sink mounting; 2 used LE, fused ansistor; 2 used LE, female; 3 contact 3, transistor

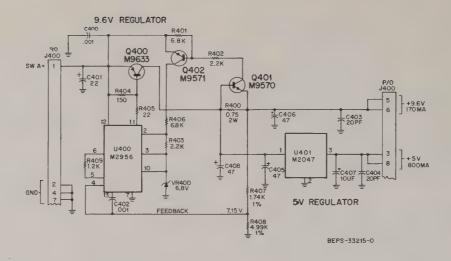
socket; 3 used

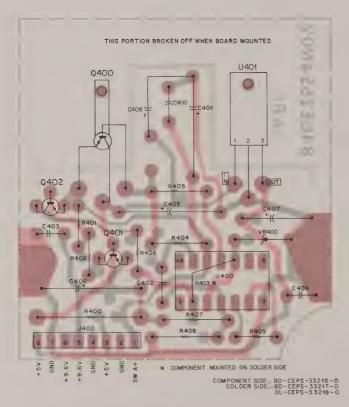
plug; 3 used 10 used RNING PLUG AC

terminal; 4 used

tors, and integrated circuits must

TRN5470A Power Supply Schematic Diagram, Circuit Board Detail, and Parts List Motorola No. PEPS-34988-O 7/14/82 - V&G





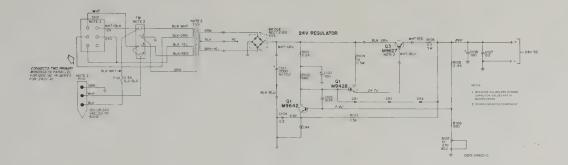
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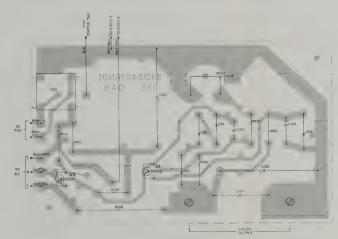
parts list

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	
		capacitor, fixed: uF ± 10%;	
		unless otherwise stated	
C400	21-83596E13	.001; 500 V	
C401	23-84762H16	22; 20 V	
C402	21-83596E13	.001; 500 V	
C403, 404	21-11014H32	20 pF ± 5%; 100 V	
C405, 406	23-83214C31	47 ± 20%; 15 V	
C407	23-84762H03	10; 20 V	
C408	23-83214C31	47 ± 20%; 15 V	
		connector, plug:	
J400	28-83323N02	male; 8-contact	
		transistor: (see note)	
Q400	48-869633	PNP; type M9633	
Q401	48-869570	NPN; type M9570	
Q402	48-869571	PNP; type M9571	
		resistor, fixed: ohms ±5%; 1/4 W;	
		unless otherwise stated	
R400	17-82036G13	0.75; 2 W	
R401	6-185A69	6.8k; 1/8 W	
R402, 403	6-185A57	2.2k; 1/8 W	
R404	6-11009A29	150	
R405	6-11009A09	22	
R406	6-185A69	6.8k; 1/8 W	
R407	6-10621C18	1740 ± 1%	
R408	6-10621C62	4990 ± 1%	
R409	6-185A51	1.2k; 1/8 W	
		integrated circuit: (see note)	
U400	51-83629M56	regulator; 9.6 V	
U401	51-84320A47	regulator; 5 V	
		voltage regulator: (see note)	
VR400	48-82256C37	Zener; 6.8 V; 1 W	

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.

TRN5058A Voltage Regulator Board Schematic Diagram, Circuit Board Detail, and Parts List Motorola No. PEPS-34965-O 7/14/82 - V&G





SHOWN FROM COMPONENT SIDE

COMPONENT SIDE - BD-CEPS - 34923 - 0 OL-CEPS - 34924 - 0

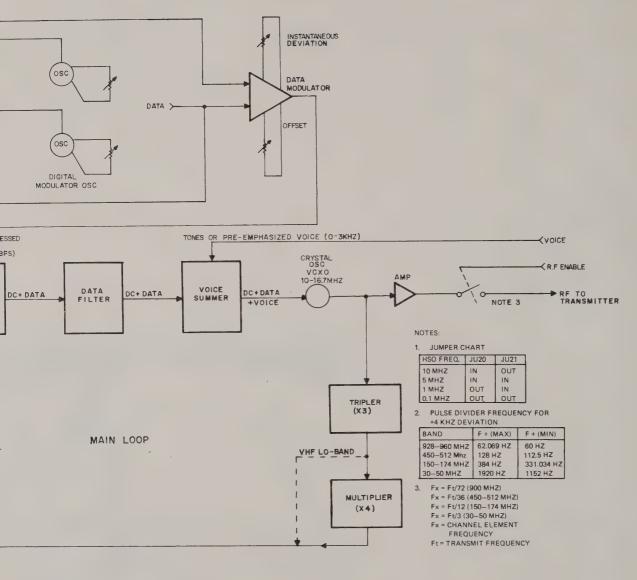
parts list

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
		capacitor, fixed:
C102	23-82077C01	100 uF + 150-10%; 35 V
C104	21-82372C05	0.2 uF + 80·20%; 25 V
C105	21-84493B27	61 pF ± 5%; 200 V
C106	23-82077C01	100 uF + 150-10%; 35 V
C110	8-82317B01	0.1 uF ± 10%; 100 V
		diode: (see note)
CR1, 2, 3	48-83654H01	silicon
CR5	48-84821E05	bridge, rectifier, 200 V
		transistor: (see note)
Q1	48-869642	NPN; type M9642
Q2	48-869428	NPN; type M9428
		resistor, fixed: ±5%; 1/4 W:
		unless otherwise stated
R101	6-11009A57	2.2k
F1102	6-11009A43	560
R103	6-11009A53	1.5k
R104	6-125C01	10; 1/2 W
R105	6-11009A58	2.4k
R106	6-11009A43	560
R107	18-83168C03	variable; 1k
R108	17-82586H08	W.W. 0.5; 5 W
		voltage regulator: (see note)
VR1	48-82256C02	Zener type; 6.8 V
		echanical parts
	3-84482M01	SCREW, machine; 6-32 x 5/16"; 2 used
	29-83362G01	TERMINAL, 2 used

REFERENCE	MOTOROLA PART NO.	DESCRIPTION
		capacitor, fixed:
C101	23-83093G21	2000 uF + 100 - 10%; 100 V
		fuse:
F101	65-475395	1/2 amp: 125 V; slow blow type
		transistor: (see note)
Ω3	48-869627	NPN: type M9627
		switch:
S101	40-84241G03	2 position; slide
		transformer
T101	25-83043L01	pri: #1 BLK-WHT, BLK-GRN; res. 29 ohms pri: #2 BLK-YEL, BLK-RED; res. 32 ohms
		sec BRN, BRN-YEL with BLK center top,
		res. 1 ohm
		terminal board:
TBt	31-120965	4 contact
		connector, plug:
P101	28-83176L01	male; 3-contact
		echanical parts NUT. 8-32 × 11/32 × 1/8"; 4 used
	2-119913 3-122922	SCREW, machine: 6-32 × 5/8"; 2 used
	3-134212	SCREW, tapping: 4-40 × 5/16"; 4 used
	3-134169	SCREW, tapping: 4-40 x 1/4", 4 used
	3-135575	SCREW, tapping: 6-32 × 5/16° 4 used
	3-136934	SCREW, tapping: 6-32 × 38"; 6 used
	4-844093	WASHER, shoulder, 2 used
	7-83181L01	BRACKET, fuseholder
	7-84139N01	BRACKET, heat sink mounting; 2 used
	9-82083C03	RECEPTACLE, fused
	9-82673A01	SOCKET, transistor, 2 used
	9-83175L01	RECEPTACLE, female; 3 contact
	14-865854	INSULATOR, transistor
	26-84212E02	HEATSINK
	29-84151L01	TERMINAL, socket; 3 used
	29-847854	LUG, tongue
	29-84150L01	TERMINAL, plug; 3 used
	42-10217A02	STRAP, tie; 10 used
	42-83123F01	RETAINER; 6 used
	54-84789L01	LABEL, WARNING
	30-83211C04	CABLE and PLUG AC
	37-107998	SLEEVING
	29-812979	LUG, crimp terminal; 4 used

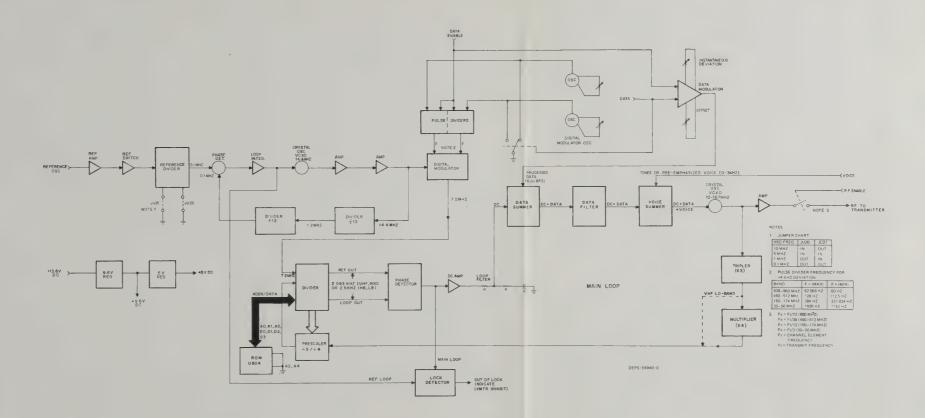
note: For optimum performance, diodes, translators, and integrated circuits must be ordered by Motorola part numbers

TRN5470A Power Supply Schematic Diagram, Circuit Board Detail, and Parts List Motorola No. PEPS-34988-O 7114/82 - V&C

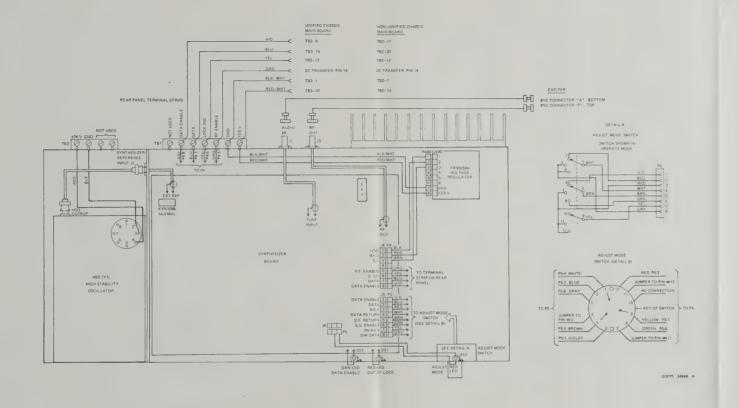


DEPS-34940-0

Paging Synthesizer Intercabling Diagram Motorola No. GDEPS-34949-A 10/5/82 - V & G

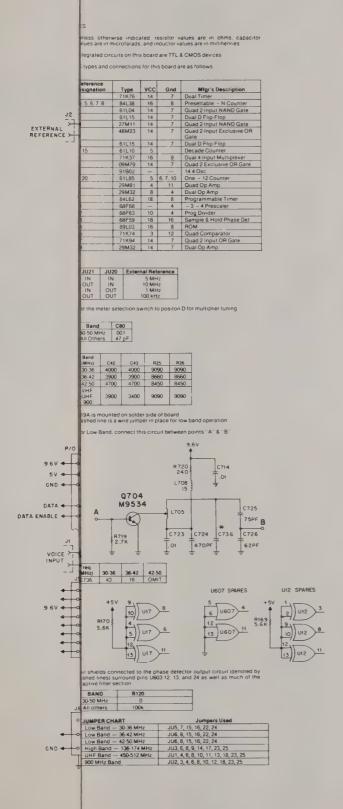


Paging Synthesizer Block Diagram Motorola No. DEPS-34940-O 7/14/82 · V&G



Paging Synthesizer Intercabling Diagram Motorola No. GDEPS-34949-A 10/5/82 · V & G





Paging Synthesizer Schematic Diagram, Circuit Board Detail, and Parts List Motorola No. PEPS-34989-O (Sheet 2 of 2) 7/14/82 - V&G

parts list

TLB8502A Synthesizer Board; 30-36 MHz

TRN5446A Synthesizer Interconnect Cable REFERENCE MOTOROLA SYMBOL PART NO DESCRIPTION light emitting diode: (see note) 48-88245C04 28-83099K01 15.83142M07 contact, receptacle: 7 used contact, receptacle; 8 used contact, receptacle; 2 used 15-83142M07 contact receptacle 5 used ewitch rotery 40-84669KC1 non-referenced Herris 30-83794C01 CABLE, coaxial, WHT: 5.75" used 3-135941 SCREW, machine: 6-32 x 1/2"; 4 used

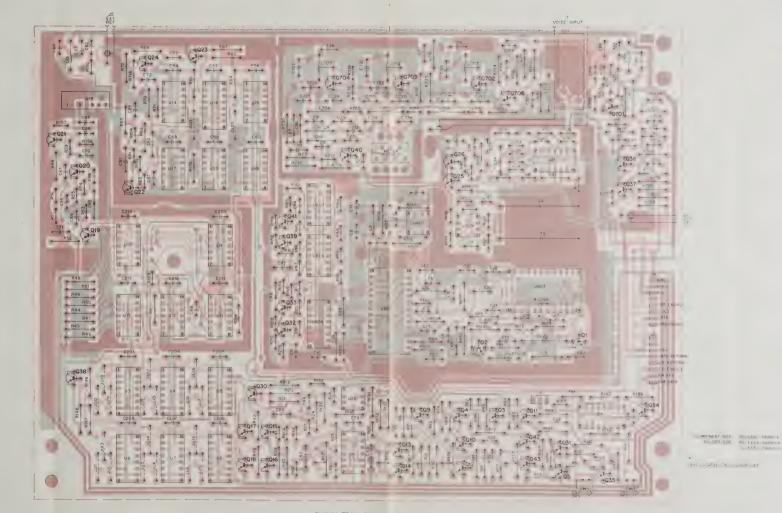
42-10217A02 STRAP, tie, 5 used 42-10217A03 STRAP, lie, 4 used

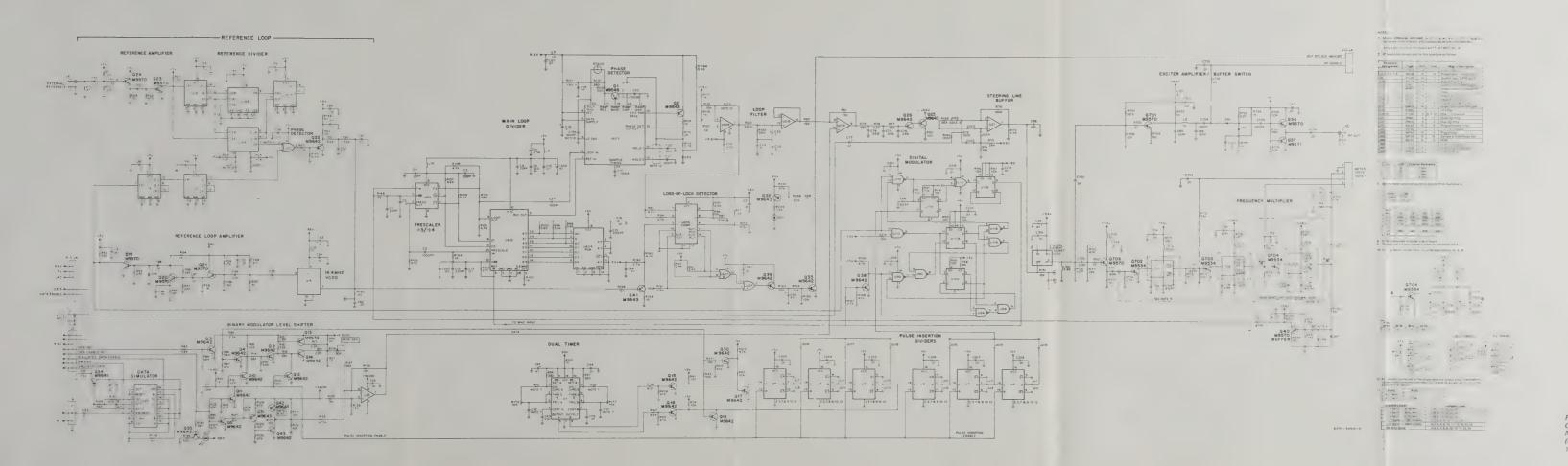
oscillator, crystat: not field serviceable order entire kit when replacing
rierenced Items
SCREW, Japping4.40 x 519°C; 14 used CVCVER, synthesize hot from includes: SPRING RETAINER: 14 used NUT, hex. 36-32 x 12'2-30'2' NUT, hex. 36-32 x 12'2-30'2' NUT, hex. 36-32 x 12'3-30'', used SCREW, tapping. 5-32 x 14'', 6 used SCREW, tapping. 5-32 x 14'', 6 used SCREW, tapping. 4-00 x 56''; 2 used HEAT SINK. CHASSIS, main GASKET, 14'' used GASKET, 14'' used GASKET, 14'' used GASKET, 14'' used MCSKET, 14'' used GASKET, 14'' used

Paging Synthesizer Schematic Diagram. Circuit Board Detail, and Parts List Motorola No. PEPS-34989-0

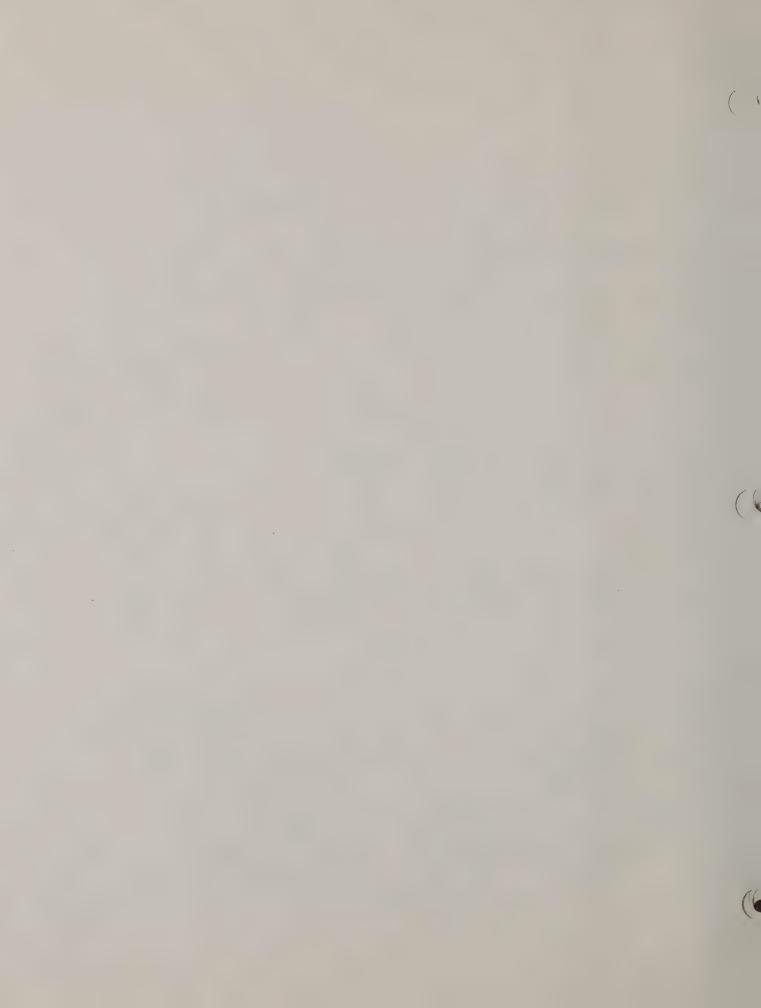
	TLB8503A Synthe TLB8504A Synthe	esizer Board, 36-4; esizer Board, 42-5;	2 MHz 5 MHz PL	8090-O								
107-0	REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	REFERE		DESCRIPTION	REFERENCE SYMBOL	MOTOROLA PART NO.		DESCRIPTION	REFERENCI SYMBOL	E MOT
			capacitor, fixed: uF ± 10%; 100 V:	L3	24-82723H07	coll, rf:	R91, 92	6-11009E58 6-11009E65	2.4k		R731	8-11009
	C2	21-11014H32	unless otherwise stated 20 pF ± 5%; 50 V	L8	24-82723H07 24-82723H07	choke; 10 uH choke; 10 uH	R93, 94 R95	6-11009E65	4.7k 2.2k		R732 R733	6-11009 6-11009
	C2 C3 C4	21-11015A07	.01 + 80-20%; 100 V	L9, 10	24-83961801	3 turns	R96	6-11009E75	12k		R734	6-11009
	C4 C5	21-11014H32 21-11015B05	20 pF ± 5%; 50 V 220 pF	L13 L701	24-82723H07 24-82723H07	choke; 10 uH choke; 10 uH	R97 R98, 99, 100	6-11009E66 6-11009A67	5.1k 5.6k			
	C6	21-82187B44	1000 pF	L701	24-80900A61	choke: 0.62 uH	R101	6-11009A67	1k		RT600	6-85840
	C8	21-11014H32	20 pF ± 5%; 50 V	L705	24-84972A15	variable; 4-1/2 turns (RED); 30-50 MHz	R103 ·	6-11009A35	270			
	C9 C10	21-11015B05 8-11017B17	220 pF 0.1; 50 V	L708 1.709	24-82549D09 24-82723H07	choke; 15 uH (30-50 MHz) choke; 10 uH	R104 R105	6-11009A49 6-11009A65	1k 4.7k		U1	51-8437
	C11	23-11013F10	0.1; 50 V 0.56; 35 V	L710	24-82723H07 24-82723H03	choke: 23 uH	R106	6-11009A65	4.7K		U3 thru 8	51-8288
	C12	21-11015B05	220 pF	2710	24021201100		R107, 108	6-11009A67	5.6k		U9 U10	51-8456 51-8456
	C13	8-11017B17	0.1; 50 V			transistor: (see note)	R109	6-11009A65	4.7k		U11	51-8362
	C14 C15	21-11015A07 21-11015B05	.01 + 80-20% 220 pF ± 5%	Q1 Q2	48-869548 48-869643	PNP; type M9548 PNP; type M9643	R110 R111	6-11009E45 6-11009A29	680 150		U12	51-6284
	C16	21-11015A07	.01 + 80-20%	Q3, 4, 5	48-869642	NPN: type M9642	R112	6-11009A39	390		U13	51-8456
	C17	8-11017B07	.0068; 50 V	Q9, 10, 11,	12 48-869642	NPN; type M9642	R113	6-11009A33	220		U14, 15 U16	51-8458 51-8437
	C18 C19	23-11013D55 23-84538G06	4 7 ± 20%. 20 V	Q13 Q14 thru 1	48-869643 8 48-869642	PNP, type M9643	R114 R115	6-11009A01 6-11009A66	10 2k		U17	51-8260
	C19A	21-11015B01	47 ± 20%, 20 V 100 pF	Q19, 20 2		NPN, type M9642 NPN, type M9570	R116	6-11009A59	2.7k		U18	51-8029
	C20	8-80027808	0039 + 5%		48-869642	NPN, type M9642	R116A	6-11009A67	5 6k		U19, 20 U21	51-8456
	C21	8-11017B06 8-11017B01	0047 50 V	Q23, 24 Q25	48-869570 48-869643	NPN, type M9570 PNP, type M9643	R117, 118 R119	6-11009E49 6-11009E73	1k 10k		U22	51-8362
	C22 C23	8-11017B01 23-84538G14	001 50 V 1: 35 V	Q25 Q26	48 869643 48-869642	NPN; type M9642	R120	6-11009B23	82k		U23	51-8288
	C24	8-80026802	5; 50 V	Q30	48-869642	NPN; type M9642	R121	6-11009E49	1k		U601 U602	51-8476 51-8476
	C25	21-11015A07	.01 + 80-20%	Q31, 32	48-869643	PNP; type M9643	R122	6-11009F10	330k		U603	51-8476
	C26 C27	21-11015A07 21-11015B01	.01 + 80-20% 100 pF	Q33, 34, 39 Q36	48-869642 48-869570	NPN; type M9642 NPN; type M9570	R123 R125, 126	6-11009E87 6-11009A89	39k 47k		U604	TRN54
	C28	8-80026802	5: 50 V	Q37	48-869571	PNP; type M9571	R127	6-11009A73	10k		U606 U607	51-8437 51-8437
	C42	21-863396	4000 pF ± 1%; 500 V (30-36 MHz)	Q38, 39	48-869642	NPN; type M9642	R128	6-11009A89	47k		U609	51-8362
		21-82537B49 8-11017A06	3900 pF ± 1% (38-42 MHz)	Q40 Q41, 42	48-869570 48-869643	NPN; type M9570 PNP; type M9643	R129 R130	6-11009A73 6-11009A89	10k 47k			
	C43	21-863396	4700 pF ± 5%; 50 V (42-50 MHz) 4000 pF ± 1%; 500 V (30-36 MHz)	Q41, 42 Q43	48-869642	NPN: tvp8 M9642	R131, 132	6-11009A73	10k			3-13421
		21-82537B49	3900 pF ± 1% (36-42 MHz)	Q701	48-869570	NPN; type M9570	R133	6-11009B14	36			9-84924
	C44. 45	8-11017A06 21-11015A07	4700 pF ± 5%; 50 V (42-50 MHz)	Q704 Q706	48-869534 48-869570	NPN; type M9534 NPN; type M9570	R134 thru 136 R137	6-11009A77 6-11009A84	15k 30k			9-84207
	C48	21-11015A07	.01 + 80-20% 62 pF ± 5%	Q100	40-002510	147 14, typa mooro	R138	6-11009A77	15k			26-8403 26-8403
	C54 thru 60	21-11015A07	01 + 80-20%			resistor, fixed: ±5%; 1/4 W:	R139	6-11009A91	56k			26-8403
	C61,62	21-82372C09 323-84538G23	0.1 + 80·20%; 25 V 01 + 80·20%	R9	6-11009A25	unless otherwise stated 100	R140 R141	6-11009A99 6-11009A67	120k 5.6k			26-8405
3108-O	C64 thru 58	21-11015A07	.01 + 80-20%	R10	6-11009A49	1k	R142	6-11009A44	620			26-8406
	C69	23-11013D55	4.7 ± 20%; 20 V	B11	6-11009A97	100k	R143 R144	6-11009A87 6-11009E87	39k 39k			26-8406
	C70 thru 73 C74	21-11015A07 8-83813H23	.01 + 80-20% .068 ± 5%; 50 V	R12 R13, 14	6-11009A81 6-11009A67	22k 5.8k	H144 R145	6-11009E93	68k			26-8406
	C75	8-83813H37	.0068 ± 5%	R15	6-11009A55	1.8k	R148	6-11009A85	4.7k			26-8409
	C76	21-84426B48	665 pF ± 5%; 500 V	R16	6-11009A61 6-11009A57	3.3k 2.2k	R147 R148	6-11009A59 6-11009A89	2.7k 47k			26-8409
	C77 C78, 79	23-84538G29 21-11015A07	47 ± 20%; 10 V .01 + 80-20%	R17 R18	6-11009A57 6-11009A87	2.2k 39k	R149	6-11009A19	56			26-8409 26-8424
	C80	8-11017B01	.001; 50 V (30-50 MHz)	R19	6-11009A57	2.2k	R150	6-11009E73	10k			42-8428
	C81	8-82905G03	.047 ± 5%; 50 V	R20, 21	6-11009A49 6-11009A73	1k 10k	R151 R152	6-11009A73 6-11009E01	10k 10			29-8001 30-8379
	C82, 83 C84	21-11015A07 23-84538G29	.01 + 80-20% 47 ± 20%; 10 V	R22 R23	6-11009A73	22k	R153	6-11009E49	1k			
	C85, 86	21-84494B29	10 pF ± 5%; 500 V	R24	6-11009A37	330	R154	6-11009E23 6-11009E71	82 8.2k		note: For optim be ordered by Me	um perfor
	C87, 88 C89	23-84538G29 21-11015A07	47 ± 20%; 10 V , .01 + 80-20%	R25	6-84376L15 6-84376L14	9090 ± 0.5% (30-36 MHz) 8680 ± 0.5% (36-42 MHz)	R155 R156	6-11009E77	5.6k			
	C91	21-11015A07 21-11015A07	.01 + 80-20%		6-84376L13	8450 ± 0.5% (42-50 MHz)	R157	6-11009E18	51			
	C93	23-84538G29	47 ± 20%; 10 V	R26	6-84376L15	9090 ± 0.5% (30-36 MHz)	R158 R159	6-11009E73 6-11009E01	10k 10			
	C94, 95 C96	21-11015A07 8-11017B01	.01 + 80-20% .001: 50 V		6-84376L14 6-84376L13	8660 ± 0.5% (36-42 MHz) 8450 ± 0.5% (42-50 MHz)	R160	6-11009E65	4 7k			
	C97	21-11017B01	.01; 50 V .01 + 80-20%	R27	6-11009E37	330	R161	6-11009E58	2 4k			
	C200	23-84538G06	47 ± 20%; 20 V	R39	6-11009A73 6-11009A89	10k 47k	R162 R163	6-11009E59 6-11009E33	2 7k 220			
	C201 C202	21-11015A07 21-82372C04	.01 + 80-20% .05 + 80-20%; 25 V	R40 R40A	6-11009A89 6-11009E89	47K	R164, 165	6-11009E73	10k			
	C203 thru 213	21-11015A07	.01 + 80-20%	R41	6-11009E73	10k	R166, 167	6-11009E71	8 2k			
	C701 thru 703	21-11015A07	.01 + 80-20%	R42 thru 5	1 8-11009A73 6-11009A39	10k 390	R168 R169, 170	6-11009E91 6-11009E67	56k 5 6k			
	C704 C705	21-11015B01 21-84493B02	100 pF 22 pF ± 5%; 50 V	R52	6-11009A39 6-11009E59	2.7k	R171	6-11009E75	12k			
	C711	21-83406D44	47 pF ± 5%; 50 V	R54	6-11009E49	1k	R172	6-11009E72 8-11009E65	9 1k			
	C714	21-11015A07	.01 + 80-20%	R55 R56	6-11009E25 6-11009E82	100 24k	R173 R174	18-84143N06	4.7k variable	e: 50k		
	C723 C724	21-11015A07 21-11015B09	.01 + 80-20% (30-60 MHz) 470 pF	H50 R57	6-11009E81	22k	R175, 176, 177	18-84143N01	variable	; 10k		
	C725	21-82204B64	75 pF ± 5%; 50 V (30-50 MHz)	R58	6-11009A49	1k	R180	6-11009E97 6-11009E81	100k			
	C726	21-82610C42	62 pF ± 5%; 50 V (30-50 MHz)	R59	6-11009E65 6-11009A67	4.7k 5.6k	R206 R209	6-11009E81 6-11009E51	22k 1.2k			
	C727 C728, 730	21-11014H41 21-11015A07	47 pF ± 5% ,01 + 80-20%	R80, 61 R62	6-11009A67	5.60	R210	6-11009E89	47k			
	C729, 730	21-11015B01	100 pF	R63	6-11009E73	10k	R211	6-11009A73 6-11009A89	10k 47k			
	C731	21-82355B62	1 pF ± 0.25 pF; 50 V	R64, 65 R66	6-11009A73 6-11009A41	10k 470	R212 R213	6-11009A89 6-11009A65	4/K 4.7k			
	C732, 733 C736	21-11015A07 21-82204B29	.01 + 80-20% 43 pF ± 3%; 50 V (30-36 MHz)	R67, 68	6-11009A41	150	R214	6-11009A73	10k			
	Crab	21-83406D93	16 pF ± 5%; 50 V (36-42 MHz)	R70, 71	6-11009A51	1.2k	R700 R701	6-11009A57 6-11009A95	2.2k 82k			
	C737	21-11015A05	.01 + 80-20%	R71A	6-11009A18 6-11009A17	51 47	R702	6-11009A95	12k			
			diode: (see note)	R72 R73, 74	6-11009E87	39k	R703	6-11009A18	51			
	CR1 2	48-83510F03	s.lcon	R75	6-11009E97	100k	R704 R710	6-11009A29 6-11009A65	150 4 7k			
	CR3	48-83329G02	silicon	R76 R77	6-11009E99 6-11009E88	120k 43k	B711	6-11009A53	1 5k			
	CR4 CR5	48-82178A01 48-83654H01	germanium silicon	R77 R78	6-11009E88 6-11009E84	43k 4.3k	R712	6-11009A18	51			
	CR6, 7	48-84616A04	hot carrier	R79	6-11009E39	390	R713 R719	6-11009A29 6-11009E59	150 2 7k/30	-54 MHz)		
	CR8	48-83654H01	silicon	R80 R81	6-11009E73 6-11009E77	10k 15k	R720	6-11009E39	240			
			light emitting diode: (see note)	R81 R82	6-11009E77 6-11009A77	15k	R722	6-11009A49	1k			
	DS1	48-88245C04	red	R83, 84	6-11009A67	5.6k 2.2k	R723 R724, 725	6-11009A57 6-11009A49	2.2K			
	DS2	48-88245C06	green	R85 R86	6-11009A57 6-11009A67	2.2k 5.6k	R726	6-11009A61	3.3k			
			connector, receptacle:	R87	6-11009A89	47k	R727 R728	6-11009A39 6-11009A61	390 3.3k			
	J1, 2, 3	9-84968D01	female; single contact	R88	6-11009A67	5.6k	R728 R729	6-11009A61 6-11009A73	3.3k 10k			
		00 000001 07	mater il control	s.roeu	D-1112Pt#RM	710	11744					

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION					
R731	6-11009A77	15k					
R732	6-11009A53	1.5k					
R733	6-11009E47	820					
R734	8-11009A09	22					
		thermistor:					
RT600	6-858402	1k @ 25°C					
		Integrated circuit: (see note)					
U1	51-84371K78	dual timer					
U3 thru 8	51-82884L38	presettable - N counter					
U9	51-84561L04	quad 2-Input NAND gate					
U10	51-84561L15	dual "D" filp-flop					
U11	51-83627M11	quad 2-Input NAND gate					
U12	51-62848M23	quad 2-input exclusive OR gate					
U13	51-84561L15	dual "D" flip-flop					
U14, 15	51-84561L10	decade counter					
U16 U17	51-84371K37	dual 4-line to 1-line multiplexer					
U18	51-82609M79 51-80291B02	quad 2 exclusive OR gate					
U19, 20	51-80291B02 51-84561L85	14 4 oscillator 1 – 12 counter					
U21	51-83629M81	quad op amplifier					
U22	51-83629M32	dual op amplifier					
U23	51-82884L62	programmable timer					
U601	51-84768F68	prescaler					
U802	51-84768F63	programmable divider					
U603	51-84768F59	sample and hold phase detector					
U604	TRN5481A	ROM (Specify Customer Frequency)					
U606	51-84371K74	quad comparator					
U607	51-84371K94	guad 2-Input OR gate					
LI609	51-83629M32	dual op amplifier					
non-referenced Items							
	3-134212	SCREW, tapping: 4-40 x 5/16": 6 used					
	9-84924E02	IC SOCKET; 18 pin					
	9-84207B01	METERING TRAY; 7 pln					
	26-84030N01	SHIELD, wall multiplier					
	26-84031N01	SHIELD, wall binary modulator					
	26-84032N01	SHIELD, component side loop filter					
	26-84055N01	SHIELD, multi solder side multiplier					
	26-84056N01	SHIELD, driver solder side divider					
	26-84061N01	SHIELD, component side ref. amplifier					
	26-84062N01	SHIELD, component side ref. loop					
	26-84063N01	SHIELD, component side binary modulate					
	26-84072N01	SHIELD, component side phase detector					
	26-84093N01	SHIELD, solder side ampl.					
	26-84094N01	SHIELD, solder side loop filter					
	26-84095N01	SHIELD, solder side of loop					
	26-84248B02	SHIELD, can					
	42-84284B01	RETAINER; 6 used					
	29-80014A01	CLIP, coaxial; 3 used					
	30-83794C01	CABLE, coaxial; WHT					





Paging Synthesizer Schematic Diagram, Circuit Board Detail, and Parts List Motorola No. PEPS-34989-O (Sheet 2 of 2) [1]4]82 - V&G





MOTOROLA INC.

Communications Sector

JUMPER AND CABLE CONNECTIONS

FOR TDN6869A/70A MODEMS

1. GENERAL

Before either of these modems can be used, certain jumpers within the modem must be placed in the proper position to ensure correct operation with the paging station.

2. JUMPER POSITIONING

Remove the housing from the modem and position the jumpers as follows:

Jumper	Position
Carrier Detect Level	- 30 dBm Level
Carrier Detect Delay	6 msec. Option
4-Wire/2-Wire Operation	4-Wire Only

Reinstall the modem housing.

3. CABLE CONNECTIONS

Refer to schematic diagram PEPS-35122 for information on how to connect the two cables supplied.

4. MODEM OPERATION

The front panel rotary switch must be in the DATA position, and the rear panel power switch placed in the ON position for proper operation of the modem. Refer to the separately supplied modem instruction manual for further information.

parts list

TLD9333A Synthesizer Board; 150-174 MHz

REFERENCE	MOTOROLA PART NO.	DESCRIPTION	
STMBOL	PART NO.	DESCRIPTION capacitor, fixed: uF ± 10%; 100 V:	
C2	21-11014H32	20 pF ± 5%; 50 V	
C2 C3 C4	21-11015A07 21-11014H32	.01 + 80-20%; 100 V 20 pF + 5%: 50 V	
C5	21-11015B05	20 pF ± 5%; 50 V .01 + 80-20%; 100 V 20 pF ± 5%; 50 V 220 pF	
C6 C8	21-82187B44	220 pF 1000 pF 20 pF ± 5%; 50 V 220 pF 0.1:50 V 0.56; 35 V	
C8	21-11014H32 21-11015B05	20 pF ± 5%; 50 V	
C10	8-11017B17	0.1:50 V	
C11	23-11013F10	0.56; 35 V	
C12	21-11015B05 8-11017B17	220 pF 0.1; 50 V	
C12 C13 C14	21-11015A07	.01 + 80-20%	
C15 C16 C17	21-11015B05	220 nE + 5%	
C16	21-11015A07 8-11017B07	.01 + 80-20%	
C18	23-11013D55	.0068; 50 V 4.7 ± 20%; 20 V 47 ± 20%; 20 V	
C19	23-84538G06	47 ± 20%; 20 V	
C19A C20	21-11015B01 8-80027B08		
C21	8-11017B06	.0039 ± 5% .0047; 50 V	
C22	8-11017801	.001: 50 V	
C23	23-84538G14	1; 35 V	
C24 C25	8-80026B02 21-11015A07	5; 50 V	
C26	21-11015A07	.01 + 80-20% .01 + 80-20%	
C27	21-11015801	100 pF 5; 50 V	
C28 C42, 43	8-80026B02 21-82537B49	3900 pF + 1%	
C44, 45	21-11015A07	.01 + 80-20%	
C48	21-11014A44	3900 pF ± 1% .01 + 80·20% 62 pF ± 5%	
C54 thru 60 C61, 62	21-11015A07 21-82372C09	.01 + 80-20% 0.1 + 80-20%; 25 V .01 + 80-20%	
C61, 62	23-84538G23	.01 + 80-20%	
C64 thru 68	6-11015A07		
C69	23-11013D55	4.7 ± 20%; 20 V .01 + 80-20% .068 ± 5%; 50 V .0088 ± 5% .665 pF ± 5%; 500 V	
C70 thru 73 C74	21-11015A07 8-83813H23	.01 + 80-20% .068 + 5%: 50 V	
C75 C76	8-83813H23 8-83813H37	.0068 ± 5%	
C76	21-84426B48	665 pF ± 5%; 500 V	
C77 C78, 79	23-84538G29 21-11015A07	47 ± 20%; 10 V .01 + 80-20%	
C80	21-11014H41	47 pF ± 5%	
C81	8-82905G03	.047 ± 5%; 50 V	
C82, 83 C84	21-11015A07 23-84538G29	.01 + 80-20%	
C85, 86	21-84494B29	47 ± 20%; 10 V 10 pF ± 5%; 500 V	
C87, 88	23-84538G29	10 pF ± 5%; 500 V 47 ± 20%; 10 V .01 + 80-20%	
C89	21-11015A07 21-11015A07	.01 + 80-20%	
C91 C93	23-84538G29	.01 + 80-20% 47 ± 20%; 10 V .01 + 80-20%	
C94, 96	21-11015A07	.01 +80-20%	
C96 C97	8-11017B01 21-11015A07	.001; 50 V .01 + 80-20%	
C200	23-84538G06	47 + 20%: 20 V	
C201	21-11015A07	47 ± 20%; 20 V .01 + 80-20%	
C202	21-82372C04	.05 + 80-20%; 25 V	
C203 thru 213 C701 thru 703	21-11015A07 21-11015A07	.01 + 80-20% .01 + 80-20%	
C704	21-11015B01		
C705	21-84493802	22 pF ± 5%; 50 V	
C711 C712	21-83406D44 21-11015A07	22 pF ± 5%; 50 V 47 pF ± 5%; 50 V .01 + 80-20%	
	21-11015B09	470 pF	
C714	21-11015A07	.01 + 80-20%	
C715 C716	21-82610C09 21-82610C42	120 pF 62 pF ± 5%; 50 V	
C716	21-84493B02	62 pr ± 5%; 50 V 22 ± 5%; 50 V	
C718, 719	21-11014H41	47 nF + 5%	
C720	21-83596E13	001: 500 V	
C721 C722	21-82610C44 21-82610C03	100 pF ± 5%; 50 V 47 pF ± 5%; 200 V 10 pF ± 0.5 pF 470 pF	
C723	21-11014H25	10 pF ± 0.5 pF	
C724	21-11015809	470 pF	
C725 C726	21-83406D93 21-82610C42	16 pF ± 5%; 50 V 62 pF ± 5%; 50 V	
	21-83406D90	16 pF ± 5%; 50 V 62 pF ± 5%; 50 V 11 pF ± 5%; 50 V 47 pF ± 5%	
C727	21-11014H41	47 pF ± 5%	
C728, 730 C729	21-11015A07 21-11015B01	.01 + 80-20% 100 pF	
C729 C731	21-82355B62	1 pF ± 0.25 pF; 50 V	
C732, 733	21-11015A07	1 pF ± 0.25 pF; 50 V .01 + 80-20%	
C734, 735	21-11015A07	.01 + 80-20%	
C737	21-11015A05	.01 + 80-20%	
		dlode: (see note)	
CR1, 2	48-83510F03	silcon	
CR3	48-83329G02 48-8217BA01	silicon	
CR4 CR5	48-83654H01	germanium sliicon	
CR6, 7	48-84616A04	hot carrier	
CR8	48-83654H01	silicon	
		light emitting diode: (see note)	
DS1	48-88245C04 48-88245C06	red green	

REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
J1, 2, 3	9-84968D01	connector, receptacle:	R83, 84	6-11009A67	5.6k
J4, 5	28-82622L07	female; single contact male; 8 contact	R85 R86	6-11009A57 6-11009A67	2.2k 5.6k
J6	28-82622L01	male: 3 contact	R87	6-11009A89	47k
			R88	6-11009A67	5,6k
1.3		coll, rf:	R89	6-11009A89	47k
	24-82723H07 24-82723H07	choke; 10 uH	R90	6-11009A73	10k
	24-83961B01	choke; 10 uH 3 turns	R91, 92 R93, 94	6-11009E58 6-11009E65	2.4k 4.7k
	24-82723H07	choke; 10 uH	R95	6-11009E57	9.7K ,2.2k
	24-82723H07	choke; 10 uH	R96	6-11009E75	12k
	24-80900A61	choke; 0.62 uH	R97	6-11009E66	5.1k
	24-84972A15 24-83857G08	tunable; 4-1/2 tums (RED)	R98, 99, 100	6-11009A67	5.6k
L705 °	24-83857G08	tunable; 3-1/2 tums (VIO)	R101 R103	6-11009A49 6-11009A35	1k 270
L706	24-82549D09	variable; 3-1/2 turns (VIO) choke; 15 uH	R104	6-11009A49	1k
L707, 708	24-82835G08	choke; 2.6 uH	R105	6-11009A65	4.7k
L709 L710	24-82723H07	choke; 10 uH	R106	6-11009A41	470
L/10	24-82723H03	choke; 23 uH	R107, 108	6-11009A67	5.6k
		transistor (see note)	R109 R110	6-11009A65 6-11009E45	4.7k 680
Q1	48-869548	PNP; type M9548	R111	6-11009E45	150
Q2	48-869643	PNP; type M9643	B112	6-11009A39	390
Q3, 4, 5	48-869642	NPN; type M9642	R113	6-11009A33	220
Q9, 10, 11, 12	48-869642	NPN; type M9642	R114	6-11009A01	10
	48-869643 48-869642	PNP, type M9643	R115	6-11009A56	2k
Q19, 20, 21	48-889570	NPN; type M9642 NPN; type M9570	R116 R116A	6-11009A59 6-11009A67	2.7k · , 5.6k
Q22	48-869642	NPN; type M9642	R117, 118	6-11009A67	1k '
	48-869570	NPN; type M9570	R119	6-11009E73	10k
	48-869643	PNP; type M9643	R120	6-11009823	82
	48-869642 48-869642	NPN; type M9642	R121	6-11009E49	1k
	48-869642 48-869643	NPN; type M9642 PNP; type M9643	R122	6-11009F10	330k
	48-869642	NPN; type M9642	R123 R125, 126	6-11009E87 6-11009A89	39k 47k
Q36	48-869570	NPN: type M9570	R127	6-11009A73	10k
Q37	48-869571	PNP: type M9571	R128	6-11009A89	47k
Q38, 39	48-869642	NPN; type M9642	R129	6-11009A73	10k
Q40 Q41, 42	48-869570 48-869643	NPN; type M9570 PNP; type M9643	F130	6-11009A89	47k
Q43	48-869642	NPN; type M9642	R131, 132 R133	6-11009A73 6-11009B14	10k
Q701	48-869570	NPN; type M9570	R134 thru 136	6-11009A77	15k
Q702, 703	48869534	NPN: type M9534	R137	6-11009A84	30k
Q704	48-869534	NPN; type M9534	R138	6-11009A77	15k
Q706	48-889570	NPN; type M9570	R139	6-11009A91	56k
		resistor, fixed: ±5%; 1/4 W:	R140 R141	6-11009A99 6-11009A67	120k 5.6k
		unless otherwise stated	R142	6-11009A67	620
	6-11009A25	100	R143	6-11009A87	,39k
	6-11009A49	1k .	F146	6-11009A65	14.7k
	6-11009A97 6-11009A81	100k	R147	6-11009A59	12.7k
R12 R13, 14	6-11009A67	22k 5.6k	R148 R149	6-11009A89 6-11009A19	47k :56
R15	6-11009A55	1.8k	R150	6-11009E73	110k
R16	6-11009A61	3,3k	R151	6-11009A73	10k
R17	6-11009A57	2.2k	R152	6-11009E01	10
R18	6-11009A87	39k	R153	6-11009E49	1k
R19 R20, 21	6-11009A57 6-11009A49	2.2k 1k	R154 R155	6-11009E23 6-11009E71	182 18.2k
R22	6-11009A73	10k	R156	6-11009E67	5.6k
	6-11009E81	22k	R157	6-11009E18	51
R24	6-11009A37	330	R158	6-11009E73	10k
R25, 26	6-84376L15	9090 ± 0.5% (136-174 MHz)	R159	6-11009E01	110
R27	6-11009E37 6-11009A73	330 10k	. R160 R161	6-11009E65	4.7k
	6-11009A/3 6-11009A89	10K 47k	H161 H162	6-11009E58 6-11009E59	2.4k 2.7k
	6-11009E89	47k	R163	6-11009E33	220
	6-11009E73	10k	R184, 165	6-11009E73	10k
	6-11009A73	10k	F166, 167	6-11009E71	B.2k
	6-11009A39 6-11009E59	390 2.7k	R168	6-11009E91	56k
	6-11009E59 6-11009E49	2.7k 1k	R169, 170 R171	6-11009E67 6-11009E75	5.6k 12k
	6-11009E49	100	H1/1 R172	6-11009E75 6-11009E72	12K 19.1k
956	6-11009E82	24k	R173	6-11009E65	4.7k
357	6-11009E81	22k	R174	18-84143N06	variable; 50k
158	6-11009A49	1k	R175, 176, 177	18-84143N01	variable; 10k
R59 R60, 81	6-11009E65 6-11009A67	4.7k 5.6k	R180 R208	6-11009E97 6-11009E81	100k 22k
160, 61 362	6-11009A43	5.6K 56O	R208 R209	6-11009E81 6-11009E51	1.2k
R63	6-11009E73	10k	R210	6-11009E89	47k
R64, 65	6-11009A73	10k	R211	6-11009A73	10k
R66	6-11009A41	470	R212	6-11009A89	,47k
967, 68	6-11009A29	150	R213	6-11009A65	4.7k
R70, 71	6-11009A51 6-11009A18	1.2k 51	R214 R700	6-11009A73 6-11009A57	10k 2.2k
H71A R72	6-11009A18 6-11009A17	47	R700	6-11009A57 6-11009A95	2.2k 82k
773, 74	6-11009E87	39k	R702	6-11009E75	12k
375	6-11009E97	100k	R703	6-11009A18	51
R76	6-11009E99	120k	R704	6-11009A29	150
	6-11009E88 6-11009E64	43k	R710	6-11009A65	4.7k
		4,3k	R711	6-11009A53	1.5k
R78		300			
R78	6-11009E39	390 10k	R712	6-11009A18	,51
R78 R79 R80		390 10k 15k	R713	6-11009A18 6-11009A29 6-11009A59	,51 150 2.7k

REFERENCE	MOTOROLA	
SYMBOL	PART NO.	DESCRIPTION
R717	6-11009A59	2.7k
R718	6-11009E34	240
R719	6-11009E49	1k
R720	6-11009E34	240
R722	6-11009A49	1k
R723	6-11009A57 6-11009A49	2.2k 1k
R724, 725	6-11009A49	3.3k
R726 R727	6-11009A61	3.3k 390
R728	6-11009A61	3,3k
R729	6-11009A73	10k
B730	6-11009A42	510
R731	6-11009A77	15k
R732	6-11009A53	1.5k
R733	6-11009E47	820
R734	6-11009A09	22
B735	6-11009E85	33k
R736	6-11009A77	15k
		thermistor;
RT600	6-858402	1k @ 25°C
		Integrated circuit: (see note)
U1	51-84371K76	dual timer
U3 thru 8	51-82884L38	presettable + N counter
U9	51-84561L04	guad 2-Input NAND gate
U10	51-84561L15	dual "O" flip-flop
U11	51-83627M11	quad 2-Input NAND gate
U12	51-82848M23	quad 2-input exclusive OR gate
U13	51-84561L15	dual "D" flip-flop
U14, 15	51-84561L10	decade counter
U16	51-84371K37	dual 4-line to 1-line multiplexer
U17	51-82609M79	quad 2 exclusive OR gate
U18	51-80291B02	14.4 oscillator
U19, 20	51-84561L85	1 + 12 counter
U21	51-83629M81	quad op amplifler
U22	51-83629M32	dual op amplifier
U23	51-82884L62	programmable timer
U601	51-84768F68	prescaler
U602	51-84768F63	programmable divider
U603	51-84768F59	sample and hold phase detector
U604	TRN5481A	ROM (Specify Gustomer Frequency)
U606	51-84371K74	quad comparator
U607	51-84371K94	quad 2-input OR gate
U609	51-83629M32	dual op amplifler
	3-134212	screenced Items SCREW, tapping: 4-40 × 5/16"; 6 used
	9-84924E02	IC SOCKET; 16 pin
	9-84207801	METERING PLUG: 7 pin
	26-84030N01	SHIELD, wall multiplier
	26-84031N01	SHIELD, wall binary modulator
	26-84032N01	SHIELD, component side loop filter
	26-84055N01	SHIELD, multi solder side multipiler
	26-84058N01	SHIELD, driver solder side divider
	26-84061N01	SHIELD, component side ref, amplifier
	26-84062N01	SHELD, component side ref. loop
	26-84063N01	SHIELD, component side binary modulator
	26-84072N01	SHIELD, component side phase detector
	26-84093N01	SHIELD, solder side ampl.
	26-84094N01	SHIELD, solder side loop filter
	26-84095N01	SHIELD, solder side of loop
	26-84248B02	SHIELD, can; 3 used
	42-84284B01	RETAINER, 6 used
	29-80014A01	CLIP, coaxial; 3 used
	30-83794C01	CABLE, coaxial; WHT
nte: Eor ontimu		indes transistors and integrated circuits must

note: For optimum performance, diodes, transistors, and integrated circuits must be ordered by Motorola part numbers.



MOTOROLA INC.

Communications Sector

JUMPER AND CABLE CONNECTIONS

FOR TDN6869A/70A MODEMS

1. GENERAL

Before either of these modems can be used, certain jumpers within the modem must be placed in the proper position to ensure correct operation with the paging station.

2. JUMPER POSITIONING

Remove the housing from the modem and position the jumpers as follows:

, Jumper	Position
Carrier Detect Level	- 30 dBm Level
Carrier Detect Delay	6 msec. Option
4-Wire/2-Wire Operation	4-Wire Only

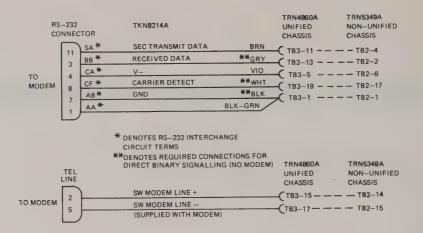
Reinstall the modem housing.

3. CABLE CONNECTIONS

Refer to schematic diagram PEPS-35122 for information on how to connect the two cables supplied.

4. MODEM OPERATION

The front panel rotary switch must be in the DATA position, and the rear panel power switch placed in the ON position for proper operation of the modem. Refer to the separately supplied modem instruction manual for further information.



BEPS-34993-A

parts list

N8214A Modern	Cable	·	PL-8135-A
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION	
		connector, plug:	
	28-84506E01	male; 25-contact	
	me	echanical parts	
	14-84502E01	HOOD, contact	
	29-812979	LUG, crimp terminal; 4 used	
	29-84078B01	LUG, flanged spade	
	42-10217A02	STRAP, tie; 10 used	



Communications Sector

WATTMETER OPTIONS

C47AD; 0-150 WATTS/25-1000 MHz C47AE; 0-400 WATTS/25-525 MHz

1. FUNCTIONAL DESCRIPTION

The C47AD/AE Wattmeter Options provide builtin metering of the transmitter forward and reverse power levels.

2. OPERATING INSTRUCTIONS

Select the desired power level and direction. Read the sampled power level from the meter. High power readings are 0-150 watts or 0-400 watts; Low power readings are 0-25 watts or 0-50 watts respectively. The meter functions are listed in the table shown in Figure 1.

NOTE

The meter should be in the OFF position when it is not in use. Do not select low power settings when measuring power levels greater than 25 watts. The power meter may falsely indicate high reflected power due to directivity in the wattmeter element.

3. RF POWER METER ADJUSTMENT

- Step 1. Key the station into a wattmeter and a 50-ohm load with rated station output power.
- Step 2. Set meter to FWD-HIGH position.
- Step 3. Adjust R1 until it agrees with the wattmeter reading.
- Step 4. Reverse the cable connections on the directional coupler.
- Step 5. Reduce the power on the station to low power for a full scale reading.
- Step 6. Put the meter switch in the REV-LOW position.
- Step 7. Adjust R7 on the power meter until it agrees with the wattmeter reading.

Step 8. Dekey the station and return all PA cables and the antenna.

4. DIRECTIONAL COUPLER KIT

4.1 FUNCTIONAL OPERATION

The directional coupler kit (wattmeter element) samples both forward and reflected power outputs of the final power amplifier. Two dc voltages are applied to the rf power meter and main interconnect board. The rf power meter uses these dc voltages to indicate forward and reflected rf power for the station. The dc voltages at the main interconnect board are routed to the optional alarm logic module. This module uses these voltages to indicate station status for possible alarm conditions.

4.2 MAINTENANCE AND TROUBLESHOOTING

The wattmeter element cannot be repaired since it contains hybrid circuitry. Consequently, the entire unit should be replaced if a fault is indicated by the following test procedure (refer to Figure 2).

- Step 1. Disconnect the antenna cable and connect a wattmeter and 50-ohm load to the antenna connector.
- Step 2. Key the station. RF power from final power amplifier passes through the wattmeter element to a wattmeter and a 50-ohm load. Verify the FWD-to-REF voltage (forward power) and the REV-to-REF voltage (reverse power) conform to those shown in Figure 3.

NOTE

The TTN6067A, 68A, 69A, & 70A Directional Coupler Kits are checked at 50 W input (50/100 W line on Figure 3). The TTN6071A, 72A, & 73A Directional Coupler Kits are checked at 100 W input (50/100 W line on Figure 3).

Step 3. Dekey the station and replace the wattmeter element if such readings cannot be obtained.

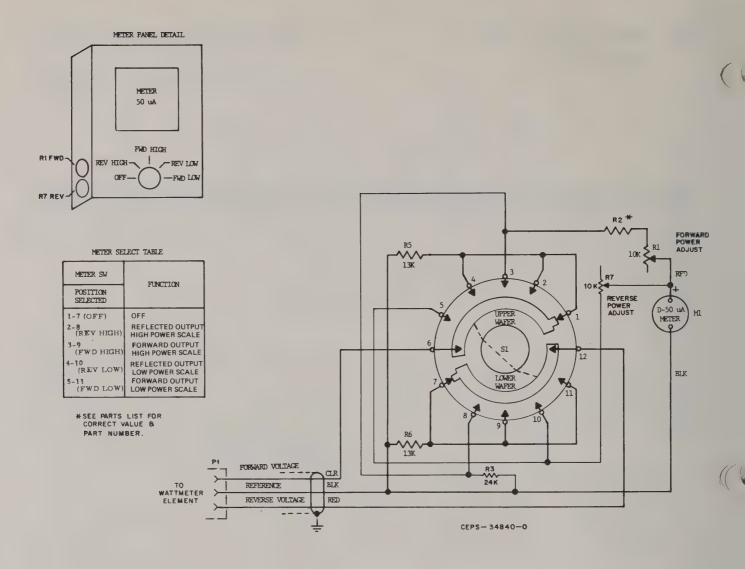


Figure 1. RF Power Meter Diagram, Meter Panel Detail & Meter Select Table

Step 4. Repeat the procedure to ascertain that the new element is in good working condition. Dekey the station.

NOTE

The wattmeter element may falsely generate a reflected power voltage due to directivity in the element. Meter accuracy is 10% of the high full-scale deflection.

Step 5. Reduce RF power to 15 to 25 watts. Repeat Steps 2 through 4.

Step 6. Dekey the station and reconnect all cables in their proper order.

Option Chart

C47AD

TTN6074A Wattmeter Kit 25-1000 MHz, 0-150 W

- *TTN6067A Directional Coupler Kit (25-100 MHz)
- *TTN6068A Directional Coupler Kit (100-225 MHz)
- *TTN6069A Directional Coupler Kit (225-525 MHz)
- *TTN6070A Directional Coupler Kit (525-1000 MHz)

C47AE

TTN6075A Wattmeter Kit 25-525 MHz, 0-400 W

- *TTN6071A Directional Coupler Kit (25-100 MHz)
- *TTN6072A Directional Coupler Kit (100-225 MHz)
- *TTN6073A Directional Coupler Kit (225-525 MHz)
- * Denotes frequency sensitive component, only one kit is used in each wattmeter kit.

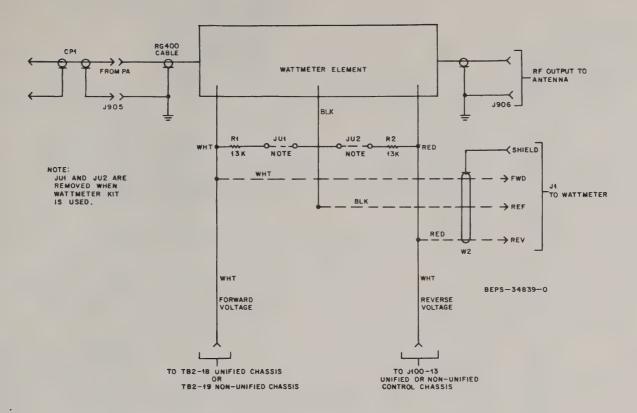


Figure 2. Directional Coupler Kit Diagram

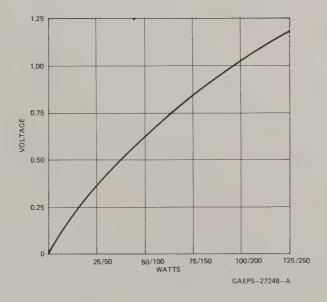


Figure 3. Wattmeter Element Voltage-vs-Power Curve

parts list

TTN6074A Wattmeter (0-150 Watt)

PL-8080-0

TTN6075A Wattm	eter (0-400 Watt)	PL-8080-O
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
M1	72-84864B15	meter: 0-150 W; 50 uA (TTN6074A)
	or 72-84864B05	0-400 W; 50 uA (TTN6075A)
		connector, plug:
P1	-	consists of:
	15-84860K01	HOUSING, connector; 4-position TERMINAL, female; 3 used
	29-84706E06	TENVITUAL, Terriale, 5 daed
		resistor, fixed: ±5%; 1/4 W:
		unless otherwise stated
R1	18-82515B41	var. 10k
R2	6-11009C79	18k (TTN6074A)
	or 6-11009C81	22k (TTN6075A) 24k
R3	6-11009C82	NOT USED
R4 R5,6	6-11009C76	13k
R7	18-82515B41	var. 10k ± 20%
10	10 020 102 1	
		switch, rotary:
S1	40-82560H02	2-pole, 5-position
		cable:
W1	30-84487C01	3-conductor; 41" used
		referenced items
		NUT, hex: 3/8-32 x 1/2 x 3/32"; 3 used
	2-7018 2-82360B26	NUT, speed; 2 used (TTN6073A)
	3-135038	SCREW, tapping: 14-14 x 3/4"; 2 used
	0 100000	(TTN6073A)
	4-7698	WASHER, lock #3/8 int.
	7-84001N01	BRACKET, wattmeter
	29-82578C01	LUG, ring tongue; 2 used
	31-490142	TERMINAL STRIP
	36-82869K01	KNOB
	42-76724	CLIP, cable
	3-139564	SCREW, captive: 3/8-24 x 1/2"; 2 used (TTN6067,68,69,70A)
	4-7668	WASHER, lock 3/8 ext; 2 used
		(TTN6067,68,69,70A)

Directional Coupler Kit
TTN6067A 0-150 Watt, 25-100 MHz
TTN6068A 0-150 Watt, 100-225 MHz
TTN6069A 0-150 Watt, 225-525 MHz
TTN6070A 0-150 Watt, 525-100 MHz
TTN6071A 0-400 Watt, 25-100 MHz
TTN6072A 0-400 Watt, 25-25 MHz
TTN6073A 0-400 Watt, 225-525 MHz

PL-8081-O

TTN6073A 0-400 V	Vatt, 225-525 MHz	PL-8081-O
REFERENCE SYMBOL	MOTOROLA PART NO.	DESCRIPTION
CP1	1-80758D35	coupler, adapter: 25-100 MHz (TTN6067A, 6068A, 6071A, 6072A)
	28-48250 28-84579F04	includes: PLUG, adapter; right angle PLUG, coaxial; 2 used
	30-84173E01 or	CABLE, coaxial; 13 used
	1-80758D36	225-525 MHz (TTN6069A) includes:
	28-82398E02 30-84173E01 or	PLUG, right angle; 2 used CABLE, coaxial; 15 used
	1-80788D29	225-1000 MHz (TTN6070A, 6073A) includes:
	28-852527	PLUG
	28-82398E02 30-84173E01	PLUG, right angle CABLE, coaxial; 11 used
		connector, receptacle:
J1	 15-84861K01	consists of: HOUSING, connector; 4-position
	29-84706E05	TERMINAL, male; 3 used
J905,906	_	p/o wattmeter element
R1,2	6-11009C76	resistor, fixed: 13k ±5%; 1/4 W
	non	-referenced items
	1-80758D34	BRACKET, directional coupler: riveted
	58-84918L05	WATTMETER ELEMENT; 25-100 MHz (TTN6067A)
	58-84918L07	WATTMETER ELEMENT; 100-225 MHz (TTN6068A)
	58-84918L09	WATTMETER ELEMENT; 225-525 MHz (TTN6069A)
	58-84918L04	WATTMETER ELEMENT; 525-1000 MHz (TTN6070A)
	58-84918L06	WATTMETER ELEMENT; 25-100 MHz (TTN6071A)
	58-84918L08	WATTMETER ELEMENT; 100-225 MHz (TTN6072A)
	58-84918L10	WATTMETER ELEMENT; 225-525 MHz (TTN6073A)
	2-82360B26	NUT, speed; 2 used (TTN6071A, 6073A)
	2-82360B34	NUT, speed; 2 used (TTN6072A) SCREW, tapping: 14-14 x 3/4"; 2 used
	3-135038	(TTN6071A, 6072A, 6073A)
	3-136924	SCREW, tapping: 4-40 x 5/16"; 2 used
	3-139564	SCREW, captive: 3/8-24 x 1/2"; 2 used (TTN6067A, 6068A, 6069A, 6070A)
	4-7668	WASHER, lock: #3/8 ext; 2 used (TTN6067A, 6068A, 6069A, 6070A)
	29-812979	LUG, crimp terminal
	39-10184A24	CONTACT, receptacle
	42-10217A02 64-83525L01	STRAP, tie; 2 used PLATE



USER QUESTIONNAIRE

To the User of This Instruction Manual:

Motorola is engaged in a continuous program of improving its instruction literature. We believe that you can aid us in this program, so that we in turn can better help you service our equipment. To foster these aims, would you please answer the following questions:

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Check item desired:	
Describes the basic logic circuits used in Motorola Communications digital equipment and the logic notational scheme used in our instruction manuals.	68P81105E88
"Digital Private-Line" Binary-Coded Squelch Contains fundamentals of "Digital Private- Line" system operation, circuit operation and servicing techniques.	68P81106E83
Safe Handling of CMOS Integrated Circuit Devices Describes special handling techniques needed to prevent irrepairable damage from static charges encountered with nor- mal handling of CMOS devices.	68P81106E84
Reducing Noise Interference in Mobile Two-Way Radio Installations Defines the major sources of noise encountered in a mobile radio installation and suggests methods of remedying them.	68P81109E33
Anti-Skid Braking Precautions Provides installation suggestions and a detailed checkout procedure for installation of mobile radios in vehicles with anti-skid braking systems.	68P81109E34
Return Address Label	
Send To Company Address	
CityZip	

NOTICE: Postal Regulations Prohibit Staples.
Please use tape.

Second Fold

> First Fold

Second Fold

Tear out page at dotted line



Please fold carefully so that bar pattern at top center of envelope can be read by postal optical scanner.



BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 75 ROSELLE, ILLINOIS

POSTAGE WILL BE PAID BY ADDRESSEE

MOTOROLA, INC. NATIONAL ACCOUNTS PARTS DEPT. 1313 E. Algonquin Road Schaumburg, Illinois 60196 NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

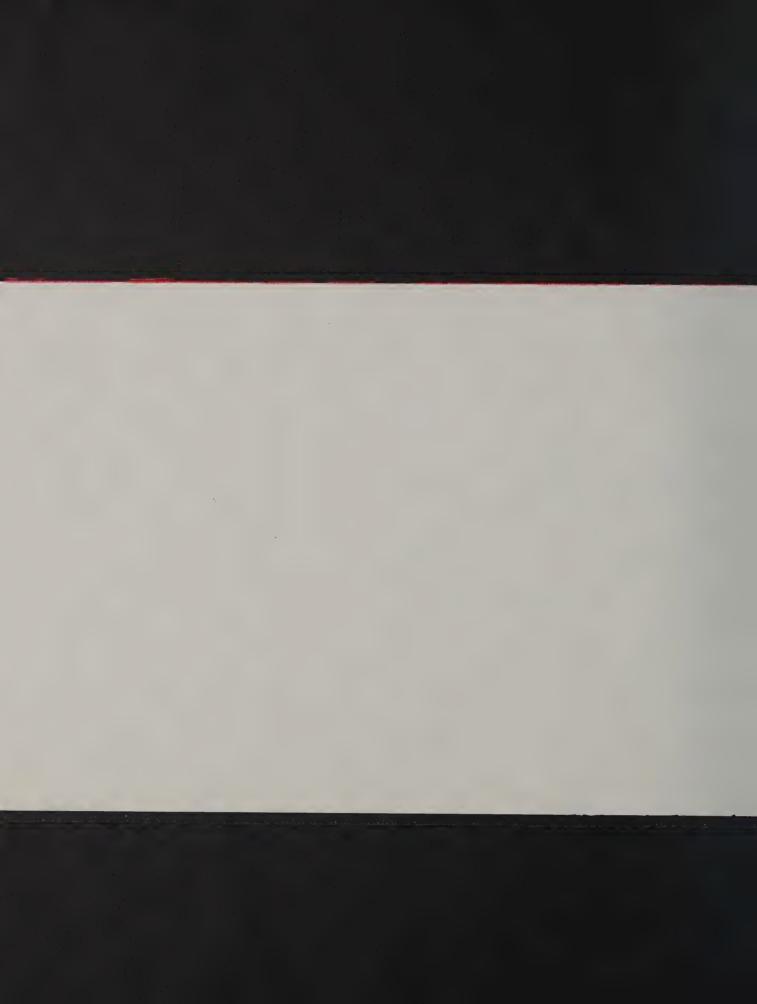




MOTOROLA Communications and Electronics Inc.

Certified Packing List

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Commercial Warranty

(STANDARD)

Motorola radio communications products are warranted to be free from defects in material and workmanship for a period of ONE (1) YEAR, except for crystal devices and channel elements which are warranted for a period of ten (10) years, from the date of shipment. Parts, including crystals and channel elements, will be replaced free of charge for the full warranty period but the labor to replace defective parts within the original shipped products plus travel costs for work on non-movable installed equipment will only be provided for One Hundred Twenty (120) days from the date of shipment. After said 120 days, Buyer must pay for the labor involved in repairing the product or replacing the parts at the prevailing rates together with any travel or transportation charges to or from the place where warranty service is provided. This express warranty is extended by Motorola Communications and Electronics, Inc., 1301 E. Algonquin Road, Schaumburg, Illinois 60196, to the original buyer only, and only to those purchasing for purpose of leasing or solely for commercial, industrial, or governmental use.

THIS WARRANTY IS GIVEN IN LIEU OF ALL OTHER WARRANTIES EXPRESS OR IMPLIED WHICH ARE SPECIFICALLY EXCLUDED, INCLUDING WARRANTIES OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL MOTOROLABE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES TO THE FULL EXTENT SUCH MAY BE DISCLAIMED BY LAW.

In the event of a defect, malfunction or failure to conform to specifications established by Seller, or if appropriate, to specifications accepted by Seller in writing, during the applicable periods stated above, Seller, at its option, will either repair or replace the product or refund the purchase price thereof, and such action on the part of Seller shall be the full extent of Seller's liability hereunder, and Buyer's exclusive remedy. This warranty shall automatically terminate if:

- a. the product is used in other than its normal and customary manner;
- b. the product has been subject to misuse, accident, neglect or damage;
- c. improper alterations or repairs have been made, or if nonconforming parts are used in the product unless done by a service facility authorized by Seller to perform warranty service.

This warranty extends only to individual products; frequency sensitive components, towers, vidicon tubes, test equipment, and batteries are excluded but carry their own separate limited warranty. Because each radio system is unique, Seller disclaims liability for range, coverage, or operation of the system as a whole under this warranty except by a separate written agreement signed by an officer of Seller.

Non-Motorola manufactured products are excluded from this warranty (unless bearing a Motorola Part Number in the form of an "alpha-numeric number"; i.e. TDE6030B) but such products are subject to the warranty provided by their manufacturers, a copy of which will be supplied to Buyer on specific written request.

Any claim for breach of this warranty shall be waived unless Buyer notifies Seller's salesperson or Seller at the above address, Attention: Quality Assurance Department, within the applicable warranty period.

This warranty applies only within the 50 United States.



MOTOROLA

Communications and Electronics Inc.

Revised date: 5/1/81 RO-O-10A 54C82256B88



PRODUCT CHECK LIST 3-22-83

- 1. FINAL ASSEMBLY
- 2. CRYSTAL INSERTION
- 3. DEPT. QUALITY
- 4. RCVR. FINAL TEST
- 5. XMTR. FINAL TEST
- 6. DEVIATION SET





7. CUSTOMER PHASING



- 8. UNIT TEST
- 9. FINAL INSPECTION DATE_
- 10. SYSTEM TESTED
- 11. FACTORY QUALITY





MOTOROLA INC.

SERIAL NO. 486 CHJ0181

F ₁		31 2 2 3
RECVR. F 2		
FREQ. F ₃		
F ₄		
QUIETING	R ₁	R ₂
QUIETING	R ₃	R ₄
POS. 2 AT QUIETING	(1)	(2)
POS. 2 AT QUIETING	(3)	(4)
BURN IN:		

2	F ₁	929	937	5	
XMTR.	F ₂				
FREQ.	F ₃	1 2			
	F ₄				
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P. O.				F ₃	F ₄
P. A.		-		(1) 245	(2)
P. A.			2	(3)	(4)
TESTED BY: M.N. Lutin					

